Nebraska Public Buildings Energy Program

Energy Calculation Handbook
Software Documentation

CONTENTS

DESCRIPTION

PROGRAM

The 'Nergy' program is an interactive, menu or question-answer driven program which will help you estimate the potential energy and dollar savings which can be realized by the construction or installation of various energy conservation projects. Each Energy Conservation Opportunity (ECO) is evaluated individually, based on site-specific data and actual measurements which you supply. In this way, it fills the gap between a generic "list of ideas" and the sophisticated engineering programs which require professional input and analysis. As each ECO is analyzed, the program displays a summary of the estimated savings and allows you the option of including the analysis in a final report. ECOs which can be analyzed by this program include roof, ceiling and wall insulation; window and door treatments; thermostat controls and lighting projects such as converting to a more efficient light source, installing low-wattage fluorescent lamps and adding lighting controls. In the experience of the Nebraska Energy Office, these are the projects most likely to provide significant savings in the buildings for which this program was written.

TECHNICAL DESCRIPTION

The program is based on standard engineering practice, particularly the "Modified Degree-Day Method" and the "Bin Method" from the ASHRAE Systems Handbook. Heat transmission and infiltration data are drawn from the ASHRAE Handbook of Fundamentals. Climate data is from the National Oceanic and Atmospheric Administration (NOAA) report of Nebraska weather (1951 to 1980) and the Armed Forces Engineering Weather Data. Light source data is from a compilation of supplier's catalogs. Savings estimates are uniformly conservative.

INTENDED USE

This program is intended to help building owners, managers and maintenance personnel make quick but reasonably accurate estimates of the potential cost savings from various ECOs. The group of buildings for which this program was designed include small schools, small commercial and civic or public buildings in which heating and lighting are the main energy-using systems. The program may be used to estimate energy savings in buildings which do not fit this model, but the results should be reviewed more carefully. This program is not capable of analyzing air conditioning, refrigeration or process energy savings and is not appropriate for buildings which have complicated air handling systems, heat pumps, heat recovery systems, energy storage and/or sophisticated energy management controls.

DOCUMENTATION

This file may be printed out using the DOS PRINT command. This is the entire documentation which is available for the program.

SYSTEM REQUIREMENTS

This program runs on IBM and IBM-compatible computers with at least 256k of RAM and DOS 2.1 or greater. A hard disk is useful but not required. Printing is to device LPT1.

GETTING STARTED

RUNNING FROM A FLOPPY DISK

If your computer is not equipped with a hard disk drive, or if you do not want to install this program on the hard drive at present, it runs correctly from the distribution diskette. Simply insert the diskette in the A: drive of your computer, switch to that drive and enter the command 'NERGY'. The program will prompt you for each additional step at the proper time.

RUNNING FROM A HARD DISK

If you want to run this program from your computer's hard disk, the distribution diskette contains a program to install the 'Nergy' program. Installation on the hard disk will allow faster operation of the program, but no other advantages. Follow these steps:

1. Switch to the hard disk drive, usually C:.
2. Place the distribution diskette in drive A:.
3. Type 'A:INSTALL' and press [enter].

The INSTALL program will create a new subdirectory called 'NERGY.100' in your root directory and copy the 'Nergy' program and all ancillary files into that directory. It will also place a batch file in your root directory which will allow you to access the program from anywhere on the hard drive. After installation, just enter the command 'NERGY'. The program will prompt you for each additional step at the proper time.

A STRATEGY FOR USING THIS PROGRAM

Look over the INSTRUCTION pages to get an idea of what the program can do for you, and then walk through the building you want to analyze and look for areas where energy is being wasted or could be used more effectively. You may want to ask one or two others, who are familiar with the building's operation, to accompany you or give you a list of other ideas for reducing energy use in the building. Talk to the people who work in each space and see what ideas or concerns they may have about conserving energy. Start the computer program and try out different possibilities. Rough estimates of size and cost are okay at this point. You may find that some ideas that sounded marginal are really quite valuable. In general, the program is only capable of analyzing one ECO at a time, so you may need to break ideas into several smaller pieces. For example, you may have a combination of lights in a gym, with 500W lamps over the playing floor and 300W lamps over the bleachers. If there are roughly the same number of each type, you could analyze them all as 400W lamps, or you could treat this as two ECOs — one for the playing floor and the other for the bleachers. Decide which ECOs look the most promising and get more careful measurements and cost estimates for these. Then run the program again to verify that they still look best. Along the way, you will probably reach a point where you need to call on a professional engineer or architect to review your results and suggest additional ECOs that you may have missed or that are beyond the scope of this program. This professional can also help coordinate actual design and installation of the ECOs.

INSTRUCTIONS

GENERAL OPERATION

BUILDING IDENTIFICATION SCREEN (optional)

After the title screen is displayed, you will be asked to enter some information regarding the building which you are analyzing. Type the requested information, and press [enter] at the end of each field to move to the next field. Use the [backspace] key to correct any errors. This information is for your use, so you need only fill in spaces that concern you. The computer simply stores this information and then prints it on the report.

COUNTY SCREEN (required)

Use the arrow keys (on the numeric keypad or cursor keys) to move the lighted bar to the name of the county where the building is located. The program needs this to choose the correct climate data.

ENTER YOUR NAME (optional)

This is simply passed through the program and printed on the title page of the report.

ENERGY CONSERVATION OPPORTUNITIES (ECO) (MAIN) MENU

This is the control center for the rest of the program. After each ECO is analyzed, this menu is displayed again. Use the arrow keys to move the lighted bar to the ECO or family of ECOs that you want to investigate. You can also press the number of the desired ECO. Press [enter] to activate your choice. To quit the 'Nergy' program, select option 6 and press [enter].

HEATING FUEL and MECHANICAL SYSTEM (ECO) INFORMATION SCREENS

The first time that you select an ECO which will conserve heating fuel, the program will take a brief detour to prompt you for information about the heating fuel and heating system. This information is used to calculate fuel cost and system efficiency. If the historical fuel use is not entered, the program will be unable to calculate the dollar savings for any thermostat setback project. If you do not have records of the last twelve month's fuel use and cost, you can obtain the information from your utility or fuel supplier. See the appropriate item under MEASUREMENTS (page B-19) for further explanation.

ELECTRIC SYSTEM INFORMATION SCREEN

The first time that you select an ECO which will conserve electricity, the program will take a brief detour to prompt you for information about the building's electricity use. This information is used to calculate the cost of electricity. If you do not have records of the last twelve month's use (kWh) and cost, you can obtain the information from your electric utility. See the appropriate item under MEASUREMENTS (page B-19) for further explanation.

PROJECT LOCATION

The calculation section for each ECO includes a prompt asking you to describe the location of the ECO. This information is only used to help identify the various ECOs on the final report. Enter the information here that will be most helpful to you (eg: "south hall", "1955 addition" or "front doors").

ROOF or CEILING INSULATION

DESCRIPTION

Insulation is probably the best known and most basic energy conservation opportunity. All materials resist the flow of heat, but some resist it much more than others. These materials are known as insulators. They are usually lightweight, porous materials that are added to roofs or ceilings to form a "blanket" around the building. It is usually most effective to add insulation to uninsulated parts of the building before adding more to areas that already have some insulation. In addition to reducing heat loss, insulation makes the building occupants more comfortable because interior surfaces of walls and ceilings stay warmer. And it takes less time to warm the building to a comfortable temperature after night setback.

CALCULATIONS

The following measurements are needed:

1. Area (sq. ft.) of roof or ceiling
   (see MEASUREMENTS, page B-22),
2. Area (sq. ft.) of skylights, if any,
3. Roof type and construction materials (see blueprints),
4. Type and thickness (inches) of any insulation already in place,
5. Amount (percentage) of water damaged insulation, if any.

Then select "Roof or Ceiling Insulation" from the Main Menu, and follow the prompts.

COMMENTS

Make sure that there is adequate ventilation above an insulated ceiling to remove any moisture which might migrate into the attic space. One square foot of ventilator area for every 150 square feet of ceiling area is recommended. Usually the roof must be replaced when a build-up roof is insulated, so it is recommended to insulate such roofs only when a new roof is necessary. This reduces the cost of the entire ECO to a reasonable value.

WALL INSULATION

DESCRIPTION

Like roof insulation, wall insulation forms a blanket around the building, resisting the loss of heat from the building and keeping the interior warm at lower cost. Frame (wood) walls are usually insulated by blowing loose insulation into the wall cavities through small holes. The holes are covered or plugged when the job is finished. Masonry walls are typically insulated by furring-out the inside walls with wood, adding foam board or batt insulation, and then enclosing the wall with drywall (gypsum board). Foam board insulation may also be glued directly to the wall and then the drywall glued to the insulation. The drywall protects the insulation and is required over foam boards for fire safety. Walls of metal buildings may be insulated by attaching paper or foil faced batt insulation, using rods or wire mesh, or by spraying on an insulation such as cellulose with glue. The lower part of these walls must be covered with wood or drywall to protect the insulation from damage. If there is already an interior wall, then the cavity may be insulated with poured or blown in insulation, or batts may be slipped down into the cavities.

CALCULATIONS

The following measurements are needed:

1. Area (sq. ft.) of walls to be treated (see MEASUREMENTS, page B-22),
2. Area (sq. ft.) of any windows or doors in this wall area,
3. Wall type and construction materials (see blueprints). Then select "Wall Insulation" from the Main Menu, and follow the prompts.

COMMENTS

This calculation assumes that there is presently no insulation in the walls. If the walls are already insulated, it will probably not be worthwhile to add more insulation.

WINDOW WEATHERSTRIP

DESCRIPTION

Installing weatherstrip is an effective way to reduce the leakage of cold air (infiltration) around the operable (movable) parts of windows. Usually, the spring metal type of weatherstrip is the most effective and durable. Nailable felt or vinyl-bulb strips may be used against the sliding surfaces and center rail of a double-hung or sliding window, while plastic V-strip can be used where surfaces meet in compression, such as the sealing surfaces of hinged windows and the bottom of double-hung units. Self-adhesive foam tape is not durable enough for most windows, although it may work all right for windows which are rarely opened. It should not be used between sliding surfaces.

CALCULATIONS

The following measurements are needed:

1. Crack length (ft.) around openable windows (see MEASUREMENTS page B-22),
2. Description of how well the windows fit. Then select the "Window Weatherstrip" option from the Windows, Doors and Skylights menu, and follow the prompts.

COMMENTS

Weatherstrip only reduces air leakage between moving parts of the window unit. If glass is loose, it should be reset in the sash with fresh putty and any broken panes should be replaced. Hinges and latches should be maintained to form a tight seal when closed. You should also caulk any cracks in the window frame itself, and the joint where the frame meets the exterior siding.

STORM WINDOWS

DESCRIPTION

Storm windows, like weatherstrip, help reduce the infiltration of cold air around the operable parts of windows. Unlike weather-strip, they also reduce leakage through cracks in the sash, around loose panes and, depending on their construction, through some cracks in the frame. They also add an insulating layer of glass or plastic which reduces heat loss through the window itself.

CALCULATIONS

The following measurements are needed:

1. Area (sq. ft.) of windows to be treated
   (see MEASUREMENTS, page B-22),
2. Crack length (ft.) around openable windows
   (see MEASUREMENTS page B-22),
3. Description of how well the windows fit. Then, select the "Storm Windows" option from the Windows, Doors and Skylights menu, and follow the prompts.

COMMENTS

If you already have storm windows or primary windows with two or more panes of glass, then this ECO should not be undertaken. Storm windows are available in many designs. Those with fixed glass (or plexiglass), permanently mounted in a sash are most effective, but they may require extra maintenance for installation in the fall and removal in the spring. Combination storms with a sliding glass panel are more convenient, but do not provide as tight a seal. If you install these storms, be sure to close the glass in the winter or the window will be ineffective. Lightweight plastic sheets, taped or stapled over windows are every bit as effective as the traditional storm window. These must be reinstalled each fall, but this may be cheaper than purchasing permanent storm windows.

REPLACE or REMOVE WINDOWS

DESCRIPTION

Glass is a very poor insulator, but is used extensively for psychological, aesthetic, safety and health reasons. These benefits are important, but many older buildings have more windows than necessary and it may be advantageous to remove unnecessary windows and replace them with an insulated frame wall or an insulated metal or vinyl clad sandwich panel. Replacing primary windows with new, double-glazed, tight-sealing windows is extremely expensive, but may be justified for very loose, leaky windows with badly deteriorated sashes and frames. Usually, a portion of the current window area is eliminated by insulating it as described above. Then fewer new windows need to be purchased and the savings from the insulation can help pay for the new windows. The ability of new windows to enhance a building's appearance and improve security and comfort may make them an attractive ECO in spite of the cost.

CALCULATIONS

The following measurements are needed:

1. Area (sq. ft.) of windows to be treated (see MEASUREMENTS, page B-22),
2. Crack length (ft.) around openable windows (see MEASUREMENTS, page B-22),
3. Description of how well the windows fit. Then, select the "Remove or Replace Windows" option from the Windows, Doors and Skylights menu, and follow the prompts.

COMMENTS

South-facing (within 15 degrees of true South) windows are a source of solar heating during the winter, so you should be cautious of any plan to eliminate them. On the other hand, if you have a room which is typically too hot, even in cold weather, you may want to reduce this solar gain. If the solar heat is nice during the winter but causes overheating in summer, consider keeping the window but adding drapes, blinds or some sort of movable insulation. An exterior overhang may be another solution to the overheating problem. If the windows currently provide enough daylight that electric lights are unnecessary, removal of the windows will increase your lighting costs. This will reduce your total savings, but it is not shown in the calculations. Make certain that enough windows remain to provide adequate ventilation during mild weather and a means of exit for fire safety. Contact your fire marshall or building inspector if you are uncertain about this. You should also consider the effects of a restricted view on building occupants.

DOORS

DESCRIPTION

Doors must operate smoothly in all sorts of weather, so it is not surprising that they often fail to seal tightly. Common maintenance requirements include checking and adjusting the hinges and latch mechanisms to assure that the door swings easily on its hinges and latches or locks smoothly when closed. When you have completed this maintenance, you may be able to reduce infiltration even more by adding weatherstrip around the top and sides of the door and a threshold or sweep at the bottom.

CALCULATIONS

The following measurements are needed:

1. Number of doors to be treated
   (each door is assumed to be 3' X 7'),
2. Door construction and materials,
3. Description of how well the doors fit. Then, select the "Door Modifications" option from the Windows, Doors and Skylights menu, and follow the prompts.

COMMENTS

Most doors are used regularly, so you need to choose a durable weatherstrip material. Spring metal, felt-in-metal and plastic-brush weatherstrip seem to stand up the best. Plastic V-strip, felt or vinyl-bulb weatherstrip may be suitable for lower-traffic areas, but it must be securely attached (ie: nailed, screwed or riveted) to the frame. Self-adhesive foam tape is usually not durable enough for use on doors. To seal under the door, you may need to adjust the threshold or replace the vinyl bulb (if so equipped). You can also add a sweep — a flexible form of weatherstrip made for this purpose.

SKY LIGHT MODIFICATIONS

DESCRIPTION

Skylights provide daylight and a sense of "openness" to enclosed spaces, but if you normally use all the interior lights anyway, you may not want to pay for the heat lost through the skylights. You may decide to cover and insulate skylights during a roof insulation and reroofing project, or you may want to modify the skylights by themselves (either by covering them or by adding another layer of glass or plastic).

CALCULATIONS

The following measurements are needed:

1. Area (sq. ft.) of the skylights
   (see MEASUREMENTS, page B-22),
2. Construction method and materials (see blueprints). If you want to cover the skylights as part of a reroofing project, then select the "Roof or Ceiling Insulation" option from the Main menu. Otherwise, select the "Skylight Modifications" option from the Windows, Doors and Skylights menu. In either case, the prompts will walk you through the calculation.

COMMENTS

If you cover and/or remove skylights where you were not previously using the interior lights, you will find that your lighting cost increases slightly which decreases your total savings. This is not calculated by the program.

GLASS BLOCK INSULATION

DESCRIPTION

Glass block walls, like skylights, provide daylight and a sense of "openness" to rooms. They typically have the thermal resistance of a double pane window, however, and that may cost more in lost heat than the benefits that the block provides. In such cases, it may be advantageous to remove the block and replace it with insulated wall.

CALCULATIONS

The following measurements are needed:

1. Area (sq. ft.) of glass block to be treated.
   (see MEASURE MENTS, page B-22). Then, select the "Glass Block Insulation" option from the Windows, Doors and Skylights menu, and follow the prompts.

COMMENTS

You may also be able to insulate these areas by furring-out the glass block and adding insulation and a suitable siding material (either interior or exterior). This adds insulation without removing the structural strength of the block. Be careful of inside insulation on South-facing block, as the insulation may trap heat behind the block and cause overheating. If removal or covering of the glass block means that electric lights must be used to replace the daylight, then the higher lighting cost will reduce your total savings. This is not calculated by the program.

LIGHTING CONVERSION

DESCRIPTION

The common incandescent lamp is one of the least effective ways to provide light to an area, but it has been widely used in the past because it was cheap, readily available and quite flexible. Now, there are several light sources which can provide the same light for only 20-50% of the cost. Fluorescent lamps, in a number of different designs, may replace incandescent lights in virtually any application, and HID (High Intensity Discharge) lamps, such as metal halide and high-pressure sodium, may replace incandescents in rooms with high ceilings or outdoor applications. In addition to their lower electricity use, these new lamps typically burn 10-20 times as long as their incandescent counterparts. This longer life (with the accompanying reduced maintenance) usually more than compensates for the higher initial cost of these lamps. Mercury vapor lights, while more efficient than incandescent, still are more costly to operate than either metal halide or high-pressure sodium lights. It may be beneficial to investigate replacing them with a more efficient light source.

CALCULATIONS

The following measurements are needed:

1. Type of lights (eg: incandescent, mercury vapor),
2. Number of lighting fixtures (may contain more than one lamp),
3. Number of lamps in each fixture,
4. Size of lamp (watts),
5. Description of existing lighting levels,
6. Annual operating hours — all the hours that the lights are "on".
   Then, select the "Convert to Fluorescent", "Convert to Metal Halide" or "Convert to HPS" options from the Lighting ECOs menu and follow the prompts.

COMMENTS

Most replacement lamps require entirely new light fixtures, but there are a few models of fluorescent lamp which can screw into an existing incandescent bulb socket — directly replacing the incandescent. Fluorescent lamps are typically used in rooms with low or medium ceiling height. When used in gymnasiums, they must be protected from damage by athletic equipment. In cold locations such as outdoors, or damp locations like shower rooms, special sealed fixtures are usually required. When installing new lights, it is a good idea to review the switching circuits. Lights near windows or glass doors should be wired to a separate switch, so that they can be turned off when daylight provides sufficient illumination. Metal halide lamps require a two-to four-minute warm-up period before they reach full light output, and may require 10 minutes or more to cool down and warm up again if the power is switched off and then back on. For this reason, they should be used in rooms where the lights will be switched on and left on for the entire day. Because of the warm-up delay, it is wise to leave several of the old incandescent lamps in place but switched separately. These lamps can be switched on for a quick walk-through or look around the room. These can also provide safety lighting in the event of a momentary power outage. High-pressure sodium lamps deliver the most light from a given amount of electricity but many people object to the golden-colored light in indoor applications, so these are normally used for outside lighting where they may be mounted on the building or on poles. Metal halide lights, in the proper fixtures, may be used outdoors as well.

FLUORESCENT LAMP REPLACEMENT

DESCRIPTION

Many rooms which are illuminated with fluorescent lamps are more brightly lighted than necessary. In these areas, the existing fluorescent tubes may be replaced with reduced-wattage tubes (eg: 34W tube replacing a 40W tube) to provide simple energy savings. The reduced wattage tubes use about 21% less electricity but the light output is only decreased by about 14%.

CALCULATIONS

The following measurements are needed:

1. Number of lighting fixtures (may be 1, 2 or 4 tube),
2. Number of tubes in each fixture,
3. Size of tube (watts),
4. Description of existing lighting levels,
5. Annual operating hours — all the hours that the lights are "on".
   Then, select the "Reduced Wattage Flourescents" option from the Lighting ECOs menu, and follow the prompts.

COMMENTS

Don't overlook small opportunities to implement this project. Energy savings is proportional to hours of use, so you should investigate high-use lights such as security lights, trophy case lights and lighted signs. You may want to start stocking the reduce-wattage lamps instead of standard fluorescents. This makes the gradual conversion to the reduced-wattage tubes very convenient and you only need to consider the extra cost of the reduced wattage tube over the standard tube. You may have heard that fluorescent lamps should not be switched off and on because it uses less energy to leave the lights on. This is not true. While it is true that rapid cycling of the lights can shorten tube life somewhat, turning on a fluorescent lamp does not require any extra electricity. In general, it is probably best to turn off fluorescent lights unless you are absolutely certain that you will be returning within 10-15 minutes.

LIGHTING CONTROLS

DESCRIPTION

Electricity used by lighting systems is directly proportional to the amount of time that these lights are used. Therefore, any reduction in burning time will result in electricity savings. Photocells may be used to turn off groups of lights (inside or outside) when sufficient daylight is available. Timers may be used to automatically turn lights on or off at preset times, which can be valuable if people normally forget to turn off security lights in the morning. An outdoor area, such as a parking lot, might even use a combination of these controls, with a photocell to turn the lights on at dusk and a timer to turn off half the lights at midnight and make sure that all lights stay off during the day.

CALCULATIONS

The following measurements are needed:

1. Type of lights (eg: incandescent, fluorescent, metal halide),
2. Number of lighting fixtures (may contain more than one lamp),
3. Number of lamps (bulbs or tubes) in each fixture,
4. Size of lamp (watts),
5. Annual operating hours — all the hours that the lights are "on".
   Then, select the "Reduce Hours of Use" or "Photocell or Timer Control" from the Lighting ECOs menu, and follow the prompts.

THERMOSTAT SETBACK

DESCRIPTION

The greater the difference between the temperature inside your building and the outside temperature, the more it costs to maintain a comfortable indoor environment. A small change in the thermostat setting can mean a big change in your dollar and energy savings with little effect on the building occupants. In most buildings, simply turning down the thermostat when the building is unoccupied is one of the easiest, most cost-effective energy conservation opportunities. Even if you already set your thermostat back, you may be able to save more by setting it back a few degrees further. Or, you may be able to increase your savings by decreasing the number of hours your building is at the occupied temperature. For example, you might begin performing maintenance and custodial tasks during the day when the building is already occupied.

CALCULATIONS

Select "Thermostat Setback" from the Main menu, and follow the prompts.

COMMENTS

You can set the thermostat back manually, or you can use a programmable clock-thermostat to do the job — there is no difference in savings. If the building is used on a predictable schedule, a programmable thermostat may be best because it can begin warming the building before occupants arrive (making them more comfortable). And, a programmable thermostat never forgets to set the temperature back after everyone goes home. On the other hand, if a reliable person manages the thermostat setback manually, it is cheaper to just continue this practice. Some people argue that setting back the thermostat allows the building to get too cold — that it takes more energy to warm the building in the morning than was saved by the setback. This is only true in buildings that are heated by electric heat pumps. In all other buildings, you simply need to ensure that the lower temperature is not harmful to the building contents or plumbing.

MEASUREMENTS

AREA

Surface areas are measured in square feet in this program. To find an area in square feet, measure the length and width of the surface (in feet) and multiply the two numbers together. An irregular area can be measured by considering it as several smaller, rectangular areas. Find the area of each small rectangle and then add the areas of all the rectangles together.

ROOF AREA

Measure only the part of the roof above heated spaces. Ignore any roof which is over an unheated space such as a porch or overhang.

WINDOW AREA

Measure the height and width of the entire opening in the wall. It may be easier to measure these two values in inches, multiply them together, and then divide the result by 144.

CRACK LENGTH

Measure the distance around each openable part of the window — any joint at which two different parts of the window are hinged, or slide or meet together. For a double-hung or sliding window, this includes the rail at the center where the two sashes meet. Measurement should be in feet, but you may want to measure in inches and then divide the result by 12.

FUEL or ELECTRICITY USE and COST

Add up all the fuel or electric bills from the preceding twelve months. You will need to supply both the number of units purchased during the period and the total cost of all the fuel or electricity.

RESULTS

SAVINGS

After the information and measurements are entered for a particular ECO, the computer screen will display a short description of the project followed by an estimate of the ECO's savings in both fuel units and dollars.

COST

The program will prompt you for the cost of the ECO. This value should be the total installed cost of the project. If you do not have any idea, then you can skip this and the program will work fine. However, if you are able to make any sort of reasonable estimate for this cost, it is best to do so. This information will allow the program to calculate a simple payback for the ECO, which will give you some idea of how beneficial it may be for the building in question.

PRINTED OUTPUT

After displaying these results, the program will ask if you want a printed report on this particular ECO. If you ask for the report, the program will add a detailed copy of the ECO description and calculations to the disk file (to be printed out later). If you see that you entered some incorrect numbers during the calculation, or if the savings just don't look very good, you may want to skip the printed copy of this calculation and try again. In either case, the Main Menu is then redisplayed.

INTERPRETATION: WHAT DOES ALL THIS MEAN?

After you have run the program with all the ECOs that seem applicable, print out the final report. Each ECO for which you requested a printed copy will be included. The analysis is in greater detail than that presented earlier on the computer screen and includes the equations which support the estimated savings. This report represents a simple collection of individual projects — the program makes no attempt to resolve conflicts or account for interaction between ECOs. Each ECO page describes one project, estimates the energy and cost savings and, if construction cost is known, calculates a simple payback for the ECO, based on current energy prices. If your energy prices stay the same, the ECO should pay for itself in energy cost savings in the number of years shown in the simple payback. If energy costs rise, then the payback period will be shorter. Simple payback is not the most accurate economic decisionmaking tool, but it is easily understood and calculated. Once you decide which of the possible ECOs you want to implement, you can figure the payback for the whole package of projects by adding up all the project costs and dividing this total by the sum of all the dollar savings estimates. The last page or two of the report show the climate data and assumptions about the heating and electric systems which the program used in the analysis of ECOs in the building. These pages give the technical basis for many of the calculations and are actually an appendix to the report. They are not additional ECO report sheets.

WHAT SHOULD YOU DO NOW?

Take the program-generated report and analyze it practically with several others who know the building. Make sure that the "existing" conditions are accurate. Look for potential conflicts between ECOs, or special conditions which might preclude certain of the ECOs. Determine which ECOs represent the best investments. Consult a knowledgeable contractor or designer to determine a reasonable cost estimate for each ECO. If you are not sure what you are doing at this point, you should invest in the services of an experienced architect, engineer or similar professional to evaluate the package of ECOs. This professional might also be able to suggest additional ECOs which would be appropriate for this particular building.

DUPLICATION AND DISTRBUTION

UNLIMITED COPYING

The Nebraska Energy Office is interested in providing appropriate technical assistance to as many people as possible. Therefore, this disk may be copied and distributed freely to anyone who may have a use for it. Please use the DOS DISKCOPY command to make an exact copy of the distribution diskette. First copies of this diskette are available from the Energy Office on request. Write to: Nebraska Energy Office, PO Box 95085, Lincoln, NE 68509, or call (402) 471-2867. Since the climate data in the program is specific to Nebraska, the usefulness of this program will be limited in other states. The Energy Office may be able to assist you in customizing this program to other climates.

FREE REGISTRATION and RESPONSE FORM

You will find a Registration and Response Form on the next page. Please use this program for a couple of weeks and then take a few minutes to fill out the Form. Registration of this product is free and will only be used to notify you of any future upgrades. Your responses to the questions will help the Energy Office evaluate the acceptance and usefulness of this product, and determine the need for improvements.

SOURCE CODE

The 'Nergy' program was written in Turbo Pascal, V.4.0. The source code runs to about 5000 lines in 11 files. Copies of the source code may be obtained from the Nebraska Energy Office, (402) 471-2867.

DISCLAIMER

This software is provided as a public service by the Nebraska Energy Office. Although every effort has been made to ensure that this software will produce accurate, high quality estimates of potential energy and cost savings, users utilize this product at their own risk. The Energy Office makes no warranty or representation, either express or implied, with respect to this program or documentation including their quality, performance or fitness for a particular purpose. The Energy Office will not be liable for any results or lack of results which come about as a result of calculations or suggestions produced by this software. Users are encouraged to seek the help of an architect, engineer or similar professional for careful, on-site analysis of each selected ECO, as well as an analysis of the interaction of various ECOs.

Response Form for "NERGY" V. 1.00

Please complete and mail to:
Nebraska Energy Office
P.O. Box 95085
Lincoln, NE 68509-5085

Name:____
Organization:___________________________________
Street:____
City:____________________State:______Zip_________

We will use the above information to make you aware of any future upgrades. Please complete the questions below to help us improve this product.

Who gave this software to you?

____

Your main use for this software is:

___ school buildings
___ small commercial buildings
___ other public buildings
___ other:____________________

Program ease of use:	poor	1	2	3	4	5	very good
Clarity of documentation:	poor	1	2	3	4	5	very good
Usefulness of results:	poor	1	2	3	4	5	very good

Describe any problems:

____

Additional features you'd like:

____

Other comments:

____

What model of computer was this used on?

____