

EE4 CBIP

User's Guide

VERSION 1.30

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1.0 INTRODUCTION

1.1 Introduction to EE4 CBIP

EE4 CBIP is a comprehensive energy analysis program designed to demonstrate and document compliance with the requirements of the Commercial Building Incentive Program (CBIP) using the computer performance approach. The Commercial Building Incentive Program is offered by the Office of Energy Efficiency of Natural Resources Canada to building owners and developers for the design and construction of new commercial and institutional buildings which use 25% less energy than similar buildings that just meet the requirements of the *Model National Energy Code for Buildings (MNECB)*. The Model National Energy Code for Buildings was developed by the Canadian Commission on Building and Fire Codes (CCBFC) and published by the National Research Council Canada.

EE4 CBIP calculations are based on an approved version of DOE-2.1E. DOE-2.1E is a comprehensive building energy analysis program developed by Lawrence Berkeley National Laboratory (LBNL) under contract with the United States Department of Energy. **EE4 CBIP** can also be used to perform non-compliance DOE-2.1E energy analyses.

NOTE: *This software is not endorsed by, authorised by or associated with the United States Department of Energy.*

EE4 CBIP is composed of an interface, which includes a building editor and a series of libraries as well as the DOE-2.1E calculation engine listed above. The program produces the appropriate energy compliance forms and supporting documentation required of CBIP applicants by the CBIP application reviewers.

1.2 Units - S.I. (Metric) and Imperial

EE4 CBIP users can choose whether to input building descriptions using either S.I. (metric) or Imperial (U.S.) units. All compliance reports are printed in S.I. units only.

1.3 About this User's Guide

This User's Guide provides an overview of **EE4 CBIP**, and instructions on how to get started. The Guide is to be used as a supplement to the comprehensive electronic help manual included within **EE4 CBIP** and referred to here as "Online Help."

2.0 GETTING STARTED

2.1 Minimum System Requirements

Here is a summary of the minimum computer system required to run **EE4 CBIP**:

Operating System	Windows NT™ or Windows 95/98™.
Computer	IBM 486 or Pentium 75 with at least 16 MB RAM. The recommended computer system features a Pentium 100 processor with 32 MB RAM.
Disk Drives	One CD-ROM drive. Your hard disk must have 20 MB of free space available for the installed program files, and an additional 20 MB free for temporary files DOE-2.1E creates during calculations.
Video Display	An SVGA monitor with minimum 800 x 600 resolution. Optimum resolution is 1024 x 768.
Printer	A laser printer with capabilities equivalent to the LaserJet 4. EE4 CBIP reports feature graphics forms. The graphics processing power available in recent printer designs considerably reduces report printing time.

2.2 Program Installation

To start the installation, insert the **EE4 CBIP** CD-ROM in the appropriate disk drive. From Windows™, select Start on the Taskbar, then choose Run. Type **A:\EE4-CBIP1.04.EXE**, (or whatever letter your CD-ROM drive is assigned to), or browse to locate the **EE4 CBIP** setup file, and press <Enter>. The **EE4 CBIP** Installation Wizard will walk you through the installation process.

During the installation, you will choose where to install the software. The simplest option is to accept the folder suggested by the Installation Wizard, **C:\CBIP**. If your computer uses Windows 95/98™, be sure that the folder name is no longer than eight characters. Once the program has been installed, you may double click on the **EE4 CBIP** icon, or choose **EE4 CBIP** from the Windows™ task bar.

2.3 Sample Projects

During the **EE4 CBIP** installation process, the program installs a sample project on your computer. The sample project is available as an item within the **EE4 CBIP** program group. You may also find the sample file in the **EE4 CBIP** Projects sub-folder.

The sample project serves as an example of how to analyse and document a typical building. You may use the step-by-step instructions contained in the online Help file. Open the Help file (select **EE4 CBIP** from the Help menu) and under the Contents tab, select Sample File. The sample file is also useful to ensure that **EE4 CBIP** is running properly. Before creating your own projects, load and run the sample file to make sure that the software is installed and operating correctly.

2.4 Your First Project

The **EE4 CBIP** interface makes inputting and analysing a building fast and easy. An easy way to create your first project is to start with the sample project provided with the software. Open the file and move through the Building Tree, adding, editing and deleting information to match your project. Don't forget to use features like the right mouse button, drag and drop, and cut/copy/paste to speed up your editing.

Libraries. Libraries are the building blocks of your project. Select the Library menu item, and browse the hundreds of pre-built library entries provided to get you up and running instantly. You may customise your default libraries to include the systems and components you use most often, so that they will be available for future projects.

Building Tree. You will provide specific information on your project in the Building Tree. Icons guide you through the building tree, making it easy to locate and define the various building elements.



Reports. Finally, there is the Report, the end product, which you provide to your client or to the CBIP application reviewers. Select Print from the File Menu to select the forms you wish to include in the report.

2.5 Getting Help

Online Manual. **EE4 CBIP** contains a complete online user's manual that you may access from the Main Menu. Select **Help/EE4 CBIP** to search for topics through the Table of Contents or the Help Index. Use the Find tab in the Help system to look up any word in the **EE4 CBIP** documentation. A word need not be a topic, it can be contained anywhere within the text. Simply type in the word you are looking for, and the online Help system displays a list of topics containing that word.

Point and Click. **EE4 CBIP** provides instant help, without interrupting your work flow. Using the "What's This?" context-sensitive help feature, you simply click on the small question mark in the corner of any dialogue box, then on the item in question, and the program displays help for that particular item.

Special Icons.

-  The Conditional icon indicates that an input is optional, or conditional upon other factors.
-  The Non-compliance icon indicates an input that is used for non-compliance analysis only, or is fixed for CBIP compliance calculations.

Click on the question mark in the corner of any dialogue box, then on the icons (Point and Click) to display specific information for inputs marked with either of these special icons.

Annotations. You may wish to write notes in the margins of your online help manual. **EE4 CBIP** allows you to do so electronically. Simply select **Edit/Annotate...** from within any Help screen, and you may add notes to any topic in the file. The Windows™ Help system automatically places a paper clip at the beginning of the topic. This will allow you to add any interpretations or explanations that you or your co-workers may find helpful. Choose

Bookmarks... from the menu and follow the instructions to create bookmarks so that you may easily access topics you use regularly.

3.0 FEATURES OF EE4 CBIP

3.1 Overview

Program Structure. The Main Menu is the *EE4 CBIP* home base. It is the menu across the top of the window that appears on your screen after you start the program. The Main Menu is the starting point and central core for managing files, navigating in the Building Tree, running calculations, preparing reports, and for accessing online Help.

Units. *EE4 CBIP* allows the user to input the project description in either S.I. (Metric) or Imperial (U.S.) units. You may switch from one to the other by selecting **Options...** from the **Tools** menu. Click on the Units tab, and make the appropriate selection. Click OK; all applicable entries are automatically converted.

EE4 CBIP can be used to perform the following calculations:

- A *CBIP* compliance analysis using an approved version of DOE-2.1E. *EE4 CBIP* is designed to analyse all buildings covered by the MNECB, primarily nonresidential buildings, high-rise or large residential buildings, and hotels/motels. The compliance calculation predicts annual building energy performance as explained in Part 8 of the *MNECB* and Section 5 of the *CBIP* technical guide(s).
- A DOE-2.1E non-compliance calculation. The non-compliance calculation uses both the compliance inputs and several variable inputs which are normally fixed for compliance to predict annual building energy performance.

EE4 CBIP analyses provide:

- Ready-to-print compliance reports, including appropriate forms and supporting worksheets required for submittal to *CBIP* application reviewers.
- Energy use summaries for nonresidential and high-rise residential buildings and hotels/motels.
- A diagnostic check to detect input errors before calculations are run.
- Comprehensive on-line documentation, including context-sensitive Help (i.e., "What's this?").

3.2 Libraries

Program libraries contain commonly used systems and components, and allow you to create, modify and store additional, frequently used items, as well as specific entries needed for a particular project.

The **Assembly Library** is used to define and calculate the R-values, U-values and heat capacities of walls, ceilings, floors and doors based upon specified components, framing percentage and framing material.

The **Fenestration Libraries** contain Glazing, Overhang, and Sidefin Libraries. These libraries are used to define glazing types, overhangs and sidefins.

The **Central Library** (Central and VAV Systems) is used to define the central and zonal system components of the HVAC system. This library lets you define standard packaged equipment, such as furnace/air conditioner combinations, and air handling equipment for built-up systems.

The **Plant Libraries** are used to define service water heating systems, boilers, chillers, cooling towers and hydronic systems for both service water heating and space conditioning.

The **Light Fixture Library** is used to define light fixtures, including lamp and energy usage information for each fixture.

The **Schedule Libraries** are used to set the weekly and yearly schedules associated with occupants, lights, equipment, infiltration, service water heating, processes, heating, cooling, and fans for a typical week and year. The Weekly Schedules are selected from within the Yearly Schedule Library. DOE-2.1E may use the default schedules based on internally fixed schedules for MNECB compliance calculations, or user-defined schedules for CBIP compliance purposes. Most often, you will modify schedules for use in non-compliance calculations.

The **Material Library** contains a comprehensive list of pre-defined ASHRAE materials, and allows you to define additional materials. Materials are selected from within the Assembly Library to define construction assemblies.

3.3 *Building Tree*

The Building Tree is the hierarchical data structure used to describe the building. The building data is organised in a hierarchical stair-step pattern of elements and sub-elements. Construct the Building Tree by entering the building description of an unlimited number of thermal Zones and HVAC Systems. The building description includes the specification of all envelope characteristics, installed lighting power, service water heating and HVAC systems. Individual Building Tree elements and specific inputs are also described in the online Help. Refer to page 8, *General Instructions for the Building Tree*, for more information on the Building Tree.

3.4 *Calculations*

Using the same basic building description, the program can perform both CBIP compliance and non-compliance DOE-2.1E calculations. Calculate either building energy compliance or general energy use from the CalcManager Menu or the Calculator button on the Tool Bar.

- DOE-2.1E computes estimated annual energy use for all building types covered by the *MNECB*. These are primarily nonresidential buildings, high-rise and large low-rise residential buildings and hotels/motels.
- DOE-2.1E is a comprehensive energy analysis tool which models packaged and built-up HVAC systems, including those with variable air volume (VAV) or simultaneous heating and cooling. See Part 8 of the *MNECB* and *Performance Compliance for Buildings 1996* (<http://www.nrc.ca/irc/catalogue/energy2.html>) for details on performance method compliance.
- DOE-2.1E was developed by Lawrence Berkeley National Laboratory (LBNL) under contract with the United States Department of Energy.

3.5 *Input Diagnostic*

Set the Input Diagnostic feature from the **CalcManager/Options** menu. Four levels of diagnosis are available: **Error**, **Warning**, **Caution** and **Information**. When a calculation is run, the Diagnostic Wizard displays a message for each item in question, shows its location, names the type of action that must be taken, and suggests a solution.

3.6 What types of buildings may you analyse with EE4 CBIP?

EE4 CBIP may be used to demonstrate energy compliance for all buildings covered by the Model National Energy Code for Buildings (MNECB). This includes:

- Nonresidential buildings
- High-rise multi-family residential buildings (greater than 3 storeys)
- Low-rise multi-family residential buildings with a building area greater than 600 m², (6459 ft²)
- Hotels/Motels

CBIP compliance calculations may be performed on both new buildings and additions.

You may also use DOE-2.1E in non-compliance mode to analyse annual energy use and energy costs for these same occupancies. Create the base DOE-2 input file using EE4 CBIP, then add the economic data to the DOE-2 file using a word processing program. Refer to the online help topic "Calculations" for detailed instructions.

3.7 What building information do you need for EE4 CBIP?

NOTE: Before you try to perform any CBIP compliance analyses, it is important that you have the most recent editions of certain manuals from the Canadian Commission on Building and Fire Codes listed in the References chapter of this guide. These publications contain key explanations of the MNECB and include information you need to run EE4 CBIP.

Once you are familiar with these manuals you can start analysing buildings. To do an analysis you need various types of project information. This information is generally found on the building plans or by discussing the project with the designer and other consultants. In some cases you must make preliminary assumptions. It is a good idea to study the building plans and specifications carefully before sitting down in front of the computer.

For a new project you typically need to input:

- Basic title block information (e.g., Project Title, Designer, etc.)
- Location and MNECB Administrative Region
- Floor, wall, roof and glazing areas
- Construction assemblies and glazing types for the building
- Characteristics of the project's HVAC, lighting and service water heating systems

If your building has common assemblies, glazing types, and HVAC and service water heating systems, you may often use the pre-defined entries in the libraries. Other inputs, such as lighting watts-per-square-metre, are required for some projects but not for others. This is covered in the detailed online Help explanations for "Libraries" and "Building Tree".

3.8 Program Procedure

1. **Open and Save:** Open a new file and immediately choose **File/Save As...** and name the file with the project name.
2. **Customise Libraries if necessary:** Two sets of libraries are available in a new file, the default libraries and the project libraries. These libraries are identical at the beginning of the project. You may create or modify items in either or both libraries. Default libraries are available to all projects, while the project libraries are specific to your current project and are saved with the file. If you modify the project libraries before constructing the Building Tree, the features you need to include will be readily available. You may also access the libraries from within the various Building Tree elements if you would prefer to customise libraries as you go. (Refer to the online Help “Libraries” topic for more complete instructions and short tutorials on editing libraries.)
3. **Construct the Building Tree:** Each element in the Building Tree is preceded by an icon to provide visual cues to assist you in making entries. You will include the project title and location, and other general identifying information such as your name, as you begin at the top of the tree. Detailed descriptions of each element in the Building Tree are provided in the online Help topic “Building Tree” and an overview is provided here in “Constructing a Building Tree” on page 11.
4. **Run Calculations:** After you completely describe your building in the Building Tree, select the type of calculations you wish to run. “Running Calculations” on page 14 lists step-by-step procedures.
5. **Print Reports:** **EE4 CBIP** reports are full-page graphics forms. Details for preparing a printed report are provided in the “Printing Reports” topic on page 18. CBIP compliance reports include a summary and detailed descriptions of the building envelope, lighting and mechanical components.

4.0 RUNNING EE4 CBIP

4.1 Before You Start...

A word of encouragement: Don't be afraid to explore all of **EE4 CBIP's** features. No matter what keys you press, you cannot damage the program in any way. In fact, experimenting with the program will increase your understanding of how it works and will give you confidence in using it before analysing complex buildings. **EE4 CBIP** was designed to be learned and used effectively in a few sittings.

4.2 What is the Building Tree?

The Building Tree is used to input general building information, HVAC systems, hot water systems, lighting systems, and the glazing and opaque surfaces associated with each room, zone and/or system. The building data is organised in a hierarchical stair-step pattern of elements and sub-elements. Building, Plant, System, Zone and Room comprise the main elements; the Room element contains sub-elements to define construction details.

4.3 General Instructions for the Building Tree

When you open **EE4 CBIP**, the program displays a blank screen under the Main Menu. Select **File/New** to open a new file; select **File/Open...** to open an existing file. All files, when first opened, display only the Building icon followed by the name of the Building. In the case of a New file, the building element, named "Undefined Building", is the only element in the Tree. Select **Building/Expand Tree** to display all elements in an existing file.

4.3.1 Describing a Building

Describe a building by defining the elements within it. To **define** an element, open it and move through the entries within that element by clicking the mouse or using the <Tab> key to highlight each input you will use. Enter data from the keyboard in the edit boxes.

Open an element in the Building Tree by pressing <Space Bar> or <Enter> or by double-clicking on the highlighted element, or by selecting **Edit** from the **Building** Menu.

Some elements are defined within tabbed dialogue boxes. Each tab is used to define a different characteristic of the element. Move from tab to tab within the main dialogue box by clicking on the tabs you want to use, or press <Ctrl><Tab>. Select **OK** to save your entries and return to the Building Tree. Select **Cancel** to return to the Building Tree without saving any entries in the dialogue box.

Display drop-down lists by clicking on the down arrow in the box, or by using the <Arrows> on the keyboard to move through the list item by item. To **make a selection** from a list, click on or press <Tab> on the highlighted list item.

Within dialogue boxes you will also find **multi-edit boxes**; select these boxes to access the appropriate **library** for that element. **Open a library** from a multi-edit box by clicking on the box or highlighting it and pressing the <Space Bar>. **Select an item** from a library window list-box by double-clicking on it, or by highlighting it with the <Arrow> keys and choosing **Select**, or pressing <Enter>. (To Edit a library item, or to create a New item, see "Libraries" in online Help. After the library has been modified to your satisfaction,

you can then choose the modified or new item from that library and continue working through the dialogue box.)

To **Close** a dialogue box:

- a) Select *OK*; your entries will be saved and you will return to the previous window (from a Library) or to the Building Tree; or
- b) Select *Cancel*; your entries will not be saved and you will return to the previous window (from a Library) or to the Building Tree.

4.3.2 Adding, Inserting, Copying and Deleting Elements

Add an element to the Building Tree by using the Add or the Insert function. **Add** will add an element of the same type as that highlighted, e.g. add a second System element. **Insert** will insert a sub-element in the Building Tree below the highlighted element, e.g., insert a Zone within a System.

Add function: To Add an element of the same type, highlight the element under which you will add the same type of element; then:

- a) Click the right mouse button and select **Add**; **or**
- b) Press the <+> key; **or**
- c) From the Main Menu, select **Building/Add**. The added element will be placed in the next available space at that element level.

Insert function: To Insert a new element of the next level down, highlight the element under which you will Insert a new element; then:

- a) Click the right mouse button and select **Insert**; **or**
- b) Press <Insert> on the keyboard; **or**
- c) From the Main Menu, select **Building/Insert**. The inserted element will be placed just below the highlighted element, i.e., above any others of its type already in place.

If you want the inserted element to be placed below others of its type, use the **Add** function, and highlight an element of the same level.

Copy function: Copy an element from one position to another on the Building Tree by highlighting the element you want to copy; then:

- a) Click the right mouse button and select **Copy**.
- b) Highlight the element under which you want to paste the selected element (you must select an element at the next higher hierarchical level).
- c) Click the right mouse button and select **Paste**. The copied element appears directly under the element you highlighted. If you do not see the choice **Paste** on the menu after clicking the right mouse button, you have not highlighted an element at the proper level for pasting. For example, to copy a Room element, you must paste it to a Zone (highlight a zone element before pasting). You cannot paste a Room under another Room element—rooms must be pasted under Zone elements.

Delete an element from the Building Tree by highlighting the element you want to delete; then:

- a) Click the right mouse button and select **Delete**; **or**
- b) Press the <Delete> key; **or**
- c) From the Main Menu, select **Building/Delete**.

4.3.3 Displaying Building Tree Elements

Display all elements in the Building Tree by clicking the right mouse button and selecting **Expand Tree**, or by selecting **Building/Expand Tree** from the Main Menu or, from the keyboard, by pressing <Alt> and then <Enter>. *In a New file, the Building element will be the only element in the Building Tree until you add or insert additional elements. You cannot expand the Building Tree to display more elements than you have placed in it.*

Display selected elements in the Building Tree by clicking the plus sign (+) in the small box to the left of an element icon.

A minus sign (-) displayed in the small box to the left of an element icon indicates that all sub-elements within that main element are displayed.

A plus sign (+) displayed in the small box to the left of an element icon indicates that there is/are element(s) embedded within that element which are not currently displayed. You may click on the plus sign to display those elements.

You may **change the order** in which elements appear on the Tree by dragging and dropping with the mouse. Because you can drop only into the top position under the main element in which you are working (e.g., re-arranging walls under a room element) you must plan your moves carefully. Start by moving the element that will have the lowest position when you are through, place it in the top position, and continue placing other elements above it until you finally move the chosen top element into the top position. You might want to experiment with this feature if you are concerned about the on-screen appearance of the Building Tree.

4.4 Editing Techniques (Mouse and Keyboard)

EE4 CBIP uses standard Windows™ features as well as some techniques unique to the program. All standard alpha-numeric keys may be used to enter data in the program.

Listed below are standard techniques you will find especially useful in **EE4 CBIP**. You do not need to know every possible technique for every operation to use the program successfully. For most operations you have a choice of techniques, depending on your preferences (keyboard vs. mouse) and your experience with Windows™ programs. To begin using the program, choose a technique you are most familiar with. As you become better acquainted with the program, you may wish to refer to this section again to see if there is a technique that may work better for you.

Menu Selection

As in any Windows™ program, you may perform most menu commands using either the mouse or the keyboard.

Mouse. Use the left mouse button to select menu items. The right mouse button activates a pop-up menu containing the most common commands.

Keyboard. If you prefer, use the <Alt> key to activate the menu bar. Select menu commands by either highlighting them using the <Arrow> keys and pressing <Enter>, or by pressing the underlined letter within the command. In addition, many of the menu commands also have accelerators, or “hot-keys” available.

Navigating through EE4 CBIP

Mouse Use the mouse as you would in any Windows™ program. Click the left mouse button to select items, move from one edit box to another, etc. Double-click any Building Tree element to define the element's characteristics.

Keyboard. You can also use the keyboard to move through the program. Open a highlighted Building Tree element with either the <Enter> key or the <Space Bar>.

The <Space Bar> has several functions in **EE4 CBIP**. It opens a highlighted Building Tree element or a multi-edit box; it also checks a checkbox or fills a circular radio button.

<Esc> moves you back to the previous active window without saving your changes.

Move forward or backward through a list or through the Building Tree with the <Arrow>, <PgUp>, <PgDn>, <Home> and <End> keys. Quickly select an item from a list (especially an alphabetised list) by typing in the first letter of the item name.

Use the <Tab> key to record an entry and move forward to the next item. <Shift><Tab> records the current data input and moves backward to the previous item.

Editing the Building Tree

All new files contain only a building element. You must add all other elements that apply to your project. Many people prefer to build a customised default or template file that contains the most common elements, with pre-defined characteristics.

Mouse. Click the left mouse button to highlight a Building Tree element for further action, e.g., to select an exterior wall element you wish to copy from one room and paste to another.

Double-click a Building Tree element to edit the element's characteristics.

To **Add**, **Insert** or **Delete** Building Tree elements, click the right mouse button, or select the Building menu, and then the appropriate command.

Keyboard. From the keyboard, <Insert> inserts the next sub-element down from the highlighted element in the Building Tree.

<+> (the plus sign) adds an element to the Building Tree of the same type as the one highlighted.

<Delete> deletes the highlighted Building Tree element and any sub-elements within it..

REMINDER: *If you press <Enter> while in a dialogue box you will close the dialogue box and return to the previous window (from a library) or to the Building Tree. Any data you input will be saved.*

4.5 Constructing a Building Tree

In the steps that follow, you will construct the frame of a Building Tree—one without actual data—to get an idea of what a completed Tree looks like, how to move around within it, and what is covered with each element. You may want to refer to this section when you are ready to model an actual building.

All building elements are included here. In practice, you will not use all elements in every job. Elements selected for constructing the Building Tree depend on the type of building and the type of calculation desired.

In a New file, the Building element will be the only element in the Building Tree until you add or insert additional elements.

Move in and out of the elements as you follow the text, viewing the input required within each element. In an actual building you would input data both directly from the beta-numeric keyboard and by using a drop-down list or library entry. In this example you will simply be viewing the elements and sub-elements, without entering data. Move through tabbed dialogue boxes by clicking on the tab title. Click *OK* or *Cancel* to close dialogue boxes and move on.

To practice by actually entering data, running calculations and preparing reports, follow the on-screen step-by-step procedures in the *Sample 1* Help file ([Help/EE4 CBIP/Contents](#) tab, Sample Files, Sample Building #1.)

Use the context-sensitive “What’s This?” help feature for more information on a particular heading.

Both the keyboard and the mouse can be used throughout the program. Only one technique is employed in the following steps, for purposes of brevity. See *Editing Techniques*, Page 10, for alternative techniques.

1. Select **File/New** from the Main Menu. Immediately choose **File/Save As...** and save the file under the project name, e.g., *Practice Building Tree*. If you do not choose a name, the program will name the file *BLD000.bld*.
2. In practice, this would be the time you might choose to customise libraries if necessary, as described step-by-step in the online Help for “Libraries.” (If your building has no unusual features and has standard equipment, you may be able to use the default libraries that come with the program without modification.) If you do not choose to customise libraries ahead of time, you can do so as you go. For this example, we will not customise libraries.
3. The New File you have opened contains only the Building element. You will add elements as you go. To begin, double-click on the **Building** icon (“Undefined Building”) to open the first element of the Building Tree. This is where you enter the building’s general information—name the building and describe its general features, its location, and list the project designers.
4. The first tab, **Project Design Data**, calls for basic building identification, location, orientation, job number, your name as the author, and the basis of space use.
5. Click on the second tab, **Project Title**, which calls for the project name and address. The data you enter here appears on project reports.
6. Click on the third tab, **Designer**, which calls for the Designer’s name and address. The data you enter here appears on project reports
7. Click *OK* to close the Building element and return to the Building Tree.
8. To insert the next element for the building, **Plant**, highlight the Building element, click the right mouse button and select **Insert**. The Plant icon and “Undefined Plant” appear on the Building Tree below the Building element.
9. Double-click on **Plant** to define the building’s Service Water Heating (SWH), Central Heating, Central Cooling, Cooling Tower and Hydronic System features and operating efficiencies by moving through the tabs with those headings.
10. Use the first tab, **Service Water**, to give the Plant a name of your choosing. Use this entry to give the Plant a name whether or not the project has a SWH system. (The Plant name does not appear on any reports.)

11. Click *OK* to close the Plant element and return to the Building Tree.
12. To insert the next element for the building, **System**, highlight the Plant element, click the right mouse button, and select **Insert** from the menu. The System element appears under the Plant element.
13. Double-click on **System** to define the building's Heating, Ventilating and Air Conditioning (HVAC) System information, including distribution losses. Within this element you will choose an HVAC unit from the Central System Library.
14. Click *OK* to return to the Building Tree.
15. To insert the next level element for the building, **Zone**, highlight the System element, click the right mouse button, and select **Insert**. The Zone element will appear under the System element.
16. Double-click on **Zone** to define the building's (or zone's, if more than one zone) General, Lighting, and Mechanical features, and to set Schedules.
17. Under the first tab, **General**, you will name the zone and define the zone type. You must briefly describe the zone including which spaces in the zone make up the thermal block. You will also enter the zone details. Select the space use type from the drop-down list if you have chosen Building Type for the Basis of Space Use in the Building element. In addition, enter the floor number, rotation, the principal heating source, and select a floor weight from the drop-down list.
18. Use the second tab, **Lighting**, to describe the lighting features of the zone. You will also specify fixture location and the percentage of heat to space, if applicable. Depending on your requirements, you may select an override Lighting Power Density (LPD).
19. Under the third tab, **Mechanical**, you will input the zone level mechanical system data, including VAV boxes, if any.
20. Under the fourth tab, **Schedules**, you will set the zone level schedules. Under the Load Profiles section you will input schedules for Lighting, Occupancy, Receptacle, Process and Service Water Heating. Under the HVAC Operation section input schedules for Fans, Heating and Cooling for the zone. You may leave the schedule inputs set to "Undefined or MNECB default". The program will use the default fixed schedules for CBIP compliance calculations.
21. Click *OK* to return to the Building Tree.
22. Insert the next level element, **Room**. The Room element appears under the Zone element.
23. Double-click on **Room** to define information specific to the building at this level. In some cases the entire building, or an entire storey of a building, may be considered a Room. For example, for a single storey office with one space-conditioning system, you will usually use just one room element to define the entire building. In that case, you may want to name the Room element "Whole Office".
24. On opening the Room element, the first tab displayed is **General**. Give the room a name and select the space use type from the list if you have chosen Space Function for the Basis of Space Use in the Building element. Also enter the floor area, and desired winter and summer temperatures.
25. Under the second tab, **Infiltration**, input the infiltration rate.
26. Under the next tab, **Occupant**, input occupant density, heat gain data, ventilation rate, and service water internal gains.
27. Under the next tab input **Equipment (Receptacle) and Process** loads.
28. Under the last tab, **Exhaust Fan**, you will input the fan airflow, design power, and multiplier.
29. Click *OK* to return to the Building Tree.
30. At this point you will have a choice of Building Tree elements under the level of the Room element. Click the right mouse button and select **Insert**. The **Select New Components** window appears in the upper left corner of the screen. Highlight the component(s) you want to select, then click *OK*. The

element(s) you have selected will be inserted under the Room element. If you select elements one at a time, repeat this step until you have selected all the elements you need.

If you select elements one at a time, you may want to control the order in which the Room elements appear on screen. For example, assume you have inserted a single Exterior Wall element.

To place the next element above the Exterior Wall element, highlight the **Room** element again, click the right mouse button, and select Insert. In the Select New Components dialogue, highlight a component, e.g., **Interior Surface**, and click **OK**. The Interior Partition appears above the Exterior Wall.

To add the Interior Partition below the Exterior Wall, highlight Exterior Wall and use the right mouse button to select Add. Note: This method of using the Add function only works in elements with multiple sub-elements available.

For this example, select all the Room elements at once. (Click the first item, then the last item in the list while pressing <Shift>.)

31. Double click **Exterior Wall**. Here you will give the wall a name (e.g., North Wall), and you will input its area, construction (using the Assembly Library), orientation (azimuth) and tilt (leave at 90° for a normal wall). If the wall is exempt from CBIP requirements, check the appropriate box.
32. You may insert two types of **sub-components** for each wall, as applicable: **Window** and **Door**. With the Exterior Wall element highlighted, click the right mouse button and select Insert. The Select New Openings dialogue box appears. Highlight Window, then click **OK** to insert a Window element as your first opening for that wall.
33. Double-click on **Window** to input the window name, and glazing details, using the Glazing Library. If the window is exempt from CBIP requirements, check the appropriate box.
34. Within the Window element, click on the next tab, **Overhang/Sidefins**, to input the size of glazing with overhangs or sidefins, and to access the Overhang and Sidefin Libraries.
35. Click **OK** to record your input and return to the Building Tree.
36. Following the same procedure as listed for Window, insert a **Door** opening.
37. Double-click on **Door** to input the name, area and construction (from the Assembly Library) of the door.
38. Click **OK** to record your input and return to the Building Tree.

In practice you will insert as many **Exterior Wall** elements and **Openings** as you need.

39. Double-click on the remaining room elements: **Interior Partition, Exposed Floor, Underground Wall, Underground Floor, Roof and Lighting** to see the inputs required for each of them.

4.6 Running Calculations

You may use either the Main Menu or click on the **Calculator** icon on the tool bar to activate calculations. Once you set Calculation Options with either method, clicking the tool bar Calculator will run calculations without displaying a menu. The following steps use the Main Menu method.

To run a calculation, set Options before you Calculate the first time: **CalcManager/Options**. See the on-line Help topic, "Calculations", for a detailed explanation of Calculations.

Calculate

Select **CalcManager/Calculate** to run Calculations. If there are diagnostic messages, the **Diagnostic Wizard** box will appear. Select Next or Back to move through the messages before viewing the results. If

you have received an **Error** message, you must correct the Error before the calculation can be performed. Select *Cancel* to return to the Building Tree.

Results for each type of calculation you have selected in **CalcManager/Options** will be displayed if there are no diagnostic messages, or after you have cleared messages and corrected Errors. For any message other than an Error, you may choose to perform the calculation without making changes: select the *Continue* button in the Diagnostic Wizard dialogue box. Arrange the Results dialogue boxes to view them all, as necessary. Close the dialogue box(es) to remove calculation results from the screen.

Results

Once you have run Calculations, you may select **CalcManager/Results** to Select Result(s) to Display. The dialogue box lists the Results available for display, based on the most recent calculations you have run. Highlight the Results you wish to see and click *OK*. The selected calculations are displayed on the screen. Delete results you no longer need from the **Select Result(s) to Display** dialogue box.

*(NOTE: Calculations which have errors will not show in the **Select Results to Display** box until you have corrected the errors and run calculations again.)*

Options

Select **CalcManager/Options** to display the **Options** dialogue box. Select the appropriate calculations and analysis features, and set the diagnostic level; then click *OK* to save your input.

4.7 Input Diagnostic

Set the Diagnostic Level from the **CalcManager/Options** menu. Choose one of the four levels in the drop-down list. The list of levels is additive from bottom to top, with Error at the top—a choice at one level includes the diagnostic above it as well. When you run the calculations, the **Diagnostic Wizard** displays a message for each item in question: shows the location and the issue, names the type of action that must be taken, and suggests a solution.

An **Error** prevents a calculation from being run. If the Diagnostic Level is set to **Errors**, the program will find all Errors which prevent the calculation from running, e.g., no assembly was selected for a particular wall.

A **Warning** indicates that there is something in the data that will probably result in inaccurate calculations. If the Diagnostic Level is set to **Warnings**, the program will find and list all **Errors** and **Warnings**, e.g., a system has a sensible cooling output which will not meet the cooling load.

A **Caution** indicates that one or more entries have been assigned a value outside the typical range. If the Diagnostic Level is set to **Cautions**, the program will find all **Errors**, give **Warnings** and also provide a **Caution** message about input values which are outside the typical range, e.g., a zone does not have an Infiltration Schedule selected. (Caution is the default level.)

Information messages provide information the MNECB requires us to bring to your attention. If the Diagnostic Level is set to **Information**, the program will find and display all **Errors**, **Warnings**, and **Cautions**, and provide relevant **Information** on the building description. (You might want to select the **Information** level the first time you run calculations on a project, then change it to a higher level once you have read the messages.)

4.8 Replacing Building Features

EE4 CBIP allows you to quickly and easily replace specific building characteristics in order to analyse the effect of changes on the building's energy use. Use the Replace Wizard to substitute construction assemblies, window features, and lighting characteristics. For example, in just a few short steps you can add insulation to an un-insulated construction assembly to measure the reduction in the heating load.

Simply select **Edit/Replace...** from the menu and let the Replace Wizard guide you through the process. **EE4 CBIP's** replace feature is very flexible. In addition to replacing an item everywhere it occurs in the file (**Global**), you may also limit the scope to include only those occurrences from the cursor forward (**From Cursor**) through the rest of the building; or only within the **Selected Branch**. If the replacement is not **Global**, highlight the appropriate element in the Building Tree before initiating the Replace Wizard. When the process is complete, a message showing the number of replacements made appears on-screen.

4.9 File Management

Managing your building description files is another important part of running the program. This involves saving building files onto a floppy or hard disk after entering data, re-loading them from disk to update or revise projects, copying files from hard disk to other media for long-term storage and finally deleting them from the disk drive when you are through with them.

Opening a File

When you open **EE4 CBIP** the program displays a blank screen under the Main Menu. Select **File/New** to open a new file; select **File/Open...** to open an existing file. All existing files, when first opened, display only the Building icon followed by the name of the Building ("Undefined Building" in the case of a New file).

Saving/Naming a File

File/Save or **Save As...** saves the file you are working in. The first time you save a New file you will be asked to name it. You may choose a name of any length.

It is wise to save each building data file often as you are working on a project and **before** you perform calculations or print reports. This prevents losing work should the program or the computer crash or some other problem occur. **Always save any file you wish to keep with an appropriate name before exiting the program.**

Warning: *When you create a New file, the New file will carry the file name BLD000.bld until you re-name it with the Save As... command. The next New file will carry the name BLD001.bld etc. Once you leave the program, future New files will be given the same name(s) (BLD000...) and could thus be saved over existing files you do not want to lose. Therefore, be sure to assign a file name to each New file you open, as soon as you open it.*

Backing Up (Copying) Files

It's a good idea to back up all your files in some way—onto individual floppy disks, a tape backup, or a separate hard drive specifically set up to store old files.

Erasing (Deleting) Files

You cannot delete files within **EE4 CBIP**. You must go to the Windows™ Explorer or File Manager to perform this operation.

Autosave Feature

You may set **EE4 CBIP** to automatically save all open files at a given time interval, provided there have been changes to the file. Select **Tools/Options...** from the Main Menu, and then click on the Autosave tab. Check the Autosave checkbox to enable the feature, and enter the frequency (in minutes) at which you wish **EE4 CBIP** to automatically save a temporary backup file in the event your system or the application crashes. The temporary file is saved in the temp directory and is given a *.tmp* filename extension.

Creating your own Template Building File

1. One of the more flexible aspects of **EE4 CBIP** is the ease with which you can create your own Template Building file.
2. Select **File/New**. **EE4 CBIP** loads the file, *BLD000.bld*, and displays the Undefined Building element and its icon.
3. **Select File/Save As...** to name your template file. If you will have one template for office buildings and another for large apartment buildings, you might name the two templates *Template-office-(your initials)* and *Template-apmt-(your initials)*. If you would like to have the Template file at the top of the list of files for easy access each time you open the program, you might want to start the name *111-...*, e.g., *111-Templ-office-...* because file lists are arranged in numerical order followed by alphabetical order.
4. Construct a Template **Building Tree**. Within each element of the Building Tree, input your own common values—any building data and report selections you ordinarily want to be there when you start a new building description. For example, enter your name and address under Documentation Author in the Project Design Data tab of the Building element. Under the General tab in the Zone element, select your most common space use, e.g., Office (Building Type Space Use Classification).
5. Customise **libraries** if desired. The Template file's libraries may contain any frequently used items that are not already part of the libraries. You may choose to leave the file's libraries as-is, and add customised items only to the Default libraries. You can Export these special items from the Default libraries into project file libraries when you need them.

NOTE: Also see "Customising Default Libraries" below. Do not confuse a Template file's libraries with Default libraries.

6. Save the file before closing it.

Customising Default Libraries

Default Libraries appear in the **Library** menu as the first set of libraries available for selection. You may choose to modify the Default libraries from time to time. This is a separate operation from modifying libraries in a particular file, e.g., your Template file or an active job file.

The primary advantage of the Default libraries is that they are easily accessible from all building files. Using the **Export** button in a library window, you can transfer information used in one project for later use in another project. For example, a particular building might use a packaged furnace/air conditioning unit from an unusual manufacturer. You could add this unit to the file's Central Library **and** Export it to the Default Central Library. Then it will be available when another project needs that particular unit.

Modify Default libraries judiciously. Keep in mind that it is the Default libraries (including any modifications you have made in the past [to these Default libraries](#)) which are automatically loaded into the program's **New File** each time you open the program.

See the online Help topic "Libraries" for step-by-step instructions on editing the various libraries.

4.10 Printing Reports

Select **File/Print...** from the Main Menu to select the forms you wish to include in the report, a **Summary Compliance Report** or a **Detailed Compliance Report**. Choose the number of report copies and define whether you wish to print the entire report or only a selected range. Next, click on the Preview button to view your report. It is ready to print, unless you choose to make changes after viewing the Report. You can page up or down through the report to view it.

4.11 Exporting Forms

EE4 CBIP allows you to electronically export either specific forms or an entire report for use in other applications. The export feature is commonly used to add the specific forms required on plans to an AutoCAD™ file.

Export Target Directory

During installation, **EE4 CBIP** automatically creates a subdirectory (entitled Export) within your program installation directory to store exported files. If you accept the installation defaults, the export target directory is C:\CBIP\Export. You may change target directories whenever you choose. Select **Tools/Options...** from the Main Menu. Specify the target directory (and the project and library directories) in the **EE4 CBIP** File Locations dialogue box.

You must restart EE4 CBIP for your selection(s) to take effect.

Exporting Forms

From the **EE4 CBIP** menu, select **File/Print...** to export forms. Select the pages you wish to export from the **Print** dialogue box. Choose All to export the entire report, or specify a page range and then click Export.

NOTE: **EE4 CBIP** forms are graphics files, and are somewhat large as a result. Exporting an entire report can take up to a full minute, depending on your computer. **EE4 CBIP** notifies you when the task is complete and where the exported files are located.

Each form (page) is individually exported as a "placeable metafile" and given a (.wmf) filename extension. The name(s) of the exported file(s) are the same as your project file with a dash and a page number corresponding to the report page number. For example, the exported pages 1 and 2 of a file named *Example.bld* will have the names *Example-1.wmf* and *Example-2.wmf* respectively.

The exported forms can be imported in any application that reads metafiles, such as Word™, Corel™, or AutoCAD™. In Word™, Insert the file as a picture. You may copy the form onto the clipboard, then use the Paste Special feature in AutoCAD™ to include the form in your file. Follow the appropriate procedure to import the forms from within other applications.

4.12 Troubleshooting Tips.

Here are a few commonly asked questions on **EE4 CBIP** operation:

1. **When I try to print a report (or select print preview), I receive an error message: pwdll.dll ERROR: The File: C:\CBIP\FORMS\COVER.TF could not be found! What's wrong?**

You are probably using Windows 95/98, and when you installed the software, you chose a directory (or folder) name longer than eight characters. The print formatting routines do not work with long filenames under Windows 95/98. Uninstall the software, then reinstall using a short directory name.

2. **I have the Windows 3.1 operating system. Why doesn't the installation program run?**

Comply is a 32 bit application. It requires either Windows NT or Windows 95/98 to work.

3. **Why is my printer taking so long to print each page in the report?**

Comply creates high quality, full-page graphics forms. This type of printout requires significant graphics processing by the printer. A modern laser printer is able to print these pages in four to five seconds each.

4. **I just opened a sample project. How do I view the entire Building Tree?**

Click the right mouse button anywhere in the project window, and select Expand Tree from the popup menu to display the entire project. Right mouse clicks are used in many places in Comply to provide quick access to commonly used commands.

5. **The program ran successfully until I installed the latest version of Comply. The installation was successful, but every time I try to run the program, it crashes.**

If you already have a version of Comply installed on your computer, you must uninstall it before installing a new version. You cannot install the new version over the old one.

6. **Several of the dialogue boxes are too big for my screen. I can't see all the controls.**

Check your monitor resolution in the Windows Control Panel. It is probably set to 640 x 480 pixels. The minimum setting to ensure proper software operation is 800 x 600 pixels.

7. **During preparation of the InstallShield Wizard by the Comply Setup, my computer becomes unresponsive.**

You are probably using Windows 95/98 in conjunction with a virus detection utility. It is recommended that all virus detection software be disabled during installation of Comply. The virus detection software may be re-enabled immediately following successful installation.

8. **I did a "non-compliance" run and the consumption of all fuels came out as zero. What's wrong?**

When you do a compliance run many of the data required to perform a simulation (eg. outdoor air ventilation rates) are defaulted according to the compliance rules. However, when you do a non-compliance run you must supply a complete set of data in order for the simulation to progress.

9. **I defined a central system with certain characteristics which working within the building tree. I then added a second system node and defined for it a different set of characteristics. When I go back to the first system I notice that its characteristics have changed, its data now being the same as for the second system. Is this a bug?**

Comply holds the detailed characteristics for central systems within the System Library. The system library may be accessed from the building tree system nodes, but the data is stored within the library, not the node. The node simply points to a library entry. In this way, you can enter the detailed information on a system in only a single library entry, and reference it from numerous system nodes.

This is a powerful, but potentially confusing feature of Comply. When you make a change to a library entry all nodes that refer to that library are updated. In your case, you have probably made a change to the same library item referenced by the first system node when you were defining your second system node.

This is why the characteristics of your original system seem to have changed. Note that other nodes in the building tree also access library items and behave in a similar manner.

10. **Why am I not able to access the Service Water tab on the Plant Element of the Building Tree?**

Answer: This is a problem with EE4 users that have the first release of the Windows 95 operating system installed on their computers. Unfortunately, this is a problem unique to this first release of Windows 95 and no patch is available.

5.0 REFERENCES

The *Model National Energy Code for Buildings, 1997* contains the specific rules and guidelines required for MNECB compliance. It is strongly recommended that you obtain a copy of the *MNECB* before attempting building energy compliance calculations.

These other publications may also be useful:

- CCBFC publications including:
Performance Compliance for Buildings, 1996 <http://www.nrc.ca/irc/catalogue/energy2.html>
- DOE-2.1E publications

DOE-2 Basics Manual (DOE-2.1E)	DE-940- 13165
BDL Summary (DOE-2.1E)	DE-940-11217
Reference Manual (DOE-2.1A)	LBL-8706, Rev. 2
Supplement (DOE-2.1E)	DE-940-11218/LL
Sample Run Book (DOE-2.1E)	DE-940-11216/LL
Engineers Manual (DOE-2.1A)	DE-830-04575/LL

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