

Retail Food Stores and CBIP

1. Introduction

With the inclusion of Retail Food Stores (RFS) in the Commercial Building Incentive Program (CBIP) a new approach to compliance demonstration was needed. Retail Food Stores have very specific characteristics, namely the presence of refrigeration equipment that can represent more than half of the total yearly building energy use. Refrigeration equipment is not included in EE4-CBIP, therefore EE Wizard was developed for RFS. This Internet-based tool simulates the energy performance of a RFS for CBIP submission following a simplified Performance Path method that requires the user to input a reduced amount of project data.

2. Overview of EE Wizard

EE Wizard is an hourly-based simulation program that uses the same DOE-2.1 run-engine than its cousin EE4. Unlike EE4, EE Wizard is available only through the Internet where all input data is entered, saved and the results are presented in a compliance report.

The main characteristic of EE Wizard is that it offers a much quicker and easier way to model the building. To do so, a number of building parameters have been predefined through the use of a building archetype. The building archetype is adapted to each specific vocation treated by the Wizard. The use of an archetype enables the user to concentrate on defining only the parameters that have the most impact on the energy efficiency of the building while the Wizard automatically constructs the rest.

Many aspects of EE Wizard are similar to those seen in EE4-CBIP. For example, EE Wizard always generates a reference building that must adhere to MNECB. The Wizard also insures that the proposed building respects minimal MNECB rules similarly to what is done by EE4-CBIP. Also, all of the Performance Path related issues stated in Part I of CBIP Technical Guide equally apply to EE Wizard.

EE Wizard can be accessed at <http://oee.nrcan.gc.ca/cbip> (french address is <http://oee.nrcan.gc.ca/pebc>) through most standard Web Browsers. Using EE Wizard does not require any special software to be installed on a computer, other than a Web browser and an Adobe AcrobatTM Reader.

Starting a Project

Starting a project using EE Wizard only requires registration so that all data can eventually be saved in a user account. The projects opened

under a user account can only be accessed by that user. A new user must first register before entering its projects. Figure 1 illustrates the data required for registration. Registration is only required in order for EE Wizard to save projects under a password protected user account.

Figure 1: Registration for EE Wizard

Natural Resources Canada / Ressources naturelles Canada

Canada

Français	Contact Us	Help	Search	Canada Site
OEE Home	Publications	Text View	Print View	NRCan Site

Welcome to the Retail Food Store Compliance Analysis Web Wizard!

Create Your Account!

Please provide the following information to create your account *NOTE: you will use your email address and password to gain access to your account.*

*(Required fields are indicated by *)*

Company/Organization Name

Contact First Name *

Contact Last Name *

Email Address *

Phone Num.

Address Line 1

Address Line 2

City

Province *

Postal Code

Account Password *

Confirm Password *

Create My Account

After registering into the EE Wizard, users can create new projects or edit existing one by simply clicking on the proper link.

Figure 2: Defining projects in EE Wizard

The screenshot shows the EE Wizard interface. At the top, there are logos for Natural Resources Canada and Ressources naturelles Canada, along with the Canada wordmark. A navigation menu includes links for Français, Contact Us, Help, Search, and Canada Site. Below this, there are links for OEE Home, Publications, Text View, Print View, and NRCan Site. A 'signed on as' field is visible. The main content area is titled 'Continue a Retail Food Store Compliance Analysis Project!' and instructs users to select from existing projects. A table lists these projects:

Project Name	Last Modified
f57t	06-04-2002 11:50AM
Example	06-29-2002 10:10PM

Below the table, there is a footer section with contact information for the Administrator and a 'Back to top' link. Two callout boxes are present: one pointing to the 'Start a New RFS Project' link with the text 'Creating a new project', and another pointing to the 'Example' project name in the table with the text 'List of existing projects'.

Saving your Project

The Wizard allows you to Save the data you entered in a project at any point in the data entry process. The data saved is recorded in EE Wizard database server and can be retrieve later on by the Applicant to continue or modify his project. No data is saved on the user's computer at any point in the analysis process.

The data is saved by clicking on the *Save* or *Save & Continue* or *Save & Go Back* buttons, as shown in Figure 3. Changing tabs using the upper tab buttons is similar to a cancel operation.

Figure 3: Saving a project's data

Home
Account Management
Start a New RFS Project
My Projects
Change to Imperial Unit of Measurement
Sign Off !!

PROJECT : Example CBIP Help [Back To Main Diagram](#)

ZONE: Food Retail with Display Cases >>

Space Definition **Window & Doors** Lighting System Schedules
Heating & Cooling Ventilation Dehumidification Refrigeration

* Floor Area: (m²)

Exterior Walls
* Total Exterior Wall Area: (m²)
* Average Exterior Wall R-Value: (m² - °C / W)

Roof
Total Roof Area: (m²)
* Average Roof R-Value: (m² - °C / W)

Floor On-ground
Total Floor Area: (m²)
Insulation Type:

Save Save & Continue >>
<< Save & Go Back

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All data in a project is available only to the Applicant through is password protected account.

Getting your Results

Results from a EE Wizard run typically consist of a Compliance Report in the form of a single Acrobat (pdf) file. The file can be downloaded from the Wizard Web site, following a successful run, by clicking on the indicated link.

The summary Compliance Report is very similar to what is produced by EE4-CBIP. A message at the bottom of each page indicates if the report

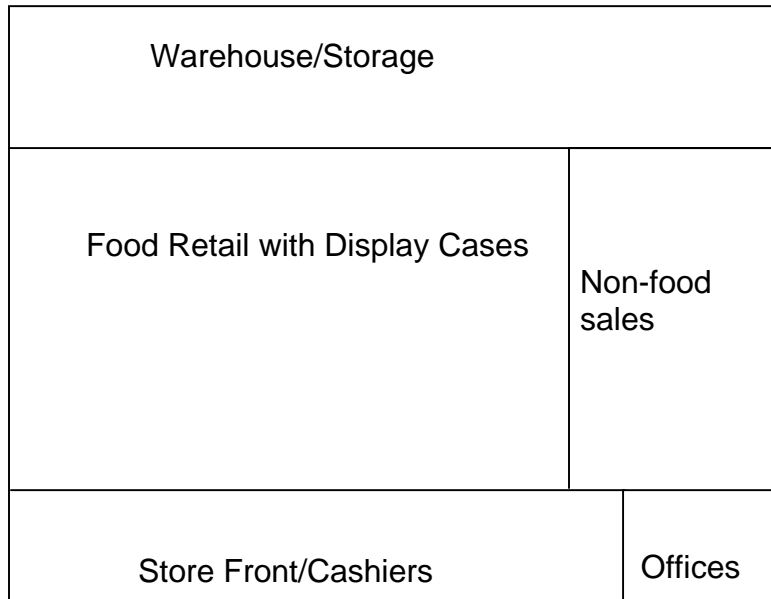
can be used for a CBIP compliant submission. The Wizard also displays summary results directly on the Results Web Page for preliminary analysis.

Zoning of RFS in EE Wizard

The building archetype adopted for RFS is based on a five-zone model as shown in Figure 4. Each zone represents a thermal block with similar periods of heating and cooling, occupation, space use, and mechanical systems.

The RFS archetype has been established based on the more commonly encountered RFS layout. However, each of the archetype zones can be ignored if it is not present in a given building, as will be shown in section 3.1.

Figure 4: EE Wizard RFS zones



Two zones allow defining refrigeration equipment:

- Food Retail with Display Cases
- Warehouse/Storage

The actual physical location of each zone relative to one another is unimportant in the Wizard. Therefore, the floor layout shown in Figure 1 is for illustration purposes only. Each zone in the Wizard can be treated as an internal zone or completely simply by defining the amount of exterior walls for

the zone. For example, any zone with no exterior walls will be treated, implicitly, as internal.

The Wizard does not account for heat transfer between zones since it assumes that they are kept at similar temperature set points.

3. Using the Wizard: Step-by-Step

Using EE Wizard does not require any knowledge of DOE or EE4. It is simply a matter of filling in the required input data. The data can be entered in almost any order, with the exception of a few values. The following presents a step-by-step description of the data input sections in EE Wizard:

3.1 Space Definition

Floor Area

As shown in Figure 4, the Wizard offers up to 5 zones when defining a RFS. The normal first step required when defining a zone in the Wizard is to enter a *Floor area* as shown in Figure 5.

NOTE: Whenever the *Floor area* is left at 0, the Wizard ignores the zone. Thus, if a zone is completely defined but its *Floor area* is left at 0, it will NOT be modeled.

Figure 5: Defining a Space in the RFS Wizard

Home PROJECT : Example << Back To Main Diagram
CBIP Help

Account Management

Start a New RFS Project

My Projects

Change to Imperial Unit of Measurement

Sign Off !!

ZONE: Food Retail with Display Cases >>

Space Definition Windows & Doors Lighting System Schedules
Heating & Cooling Ventilation Dehumidification Refrigeration

* Floor Area: (m²) ← Initial step: defining the conditioned floor area

Exterior Walls
* Total Exterior Wall Area: (m²)
* Average Exterior Wall R-Value: (m² · °C / W)

Roof
Total Roof Area: (m²)
* Average Roof R-Value: (m² · °C / W)

Floor On-ground
Total Floor Area: (m²)
Insulation Type:
Uninsulated

Save Save & Continue >>
<< Save & Go Back

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The value entered for the *Floor area* must be the summation of the conditioned floor areas for all the rooms comprised in a zone (as defined in MNECB article 1.1.3.2). The spaces in an actual RFS are likely not to correspond directly to those available in the RFS Wizard. In these cases, the user must assign each of his actual spaces to one of the RFS space.

Some general guidelines on how to assign actual spaces to the pre-established RFS spaces are provided in the *User's Tips* section.

Total Exterior Wall Area

The next step in defining a zone consists in entering its external wall area. This wall area is the summation of all walls exposed to ambient conditions, including unconditioned spaces, for all the spaces comprised in that zone. The wall area entered must be the gross wall area, including any doors and windows.

NOTE: If windows or doors are to be defined in a zone, the value for *Total Exterior Wall Area* must be defined first.

The Wizard does not require opaque walls orientation. Only window elements require defining an orientation.

Average Exterior Walls R-value

If a value is entered for the exterior wall area, its average overall R-value must be defined. This R-value corresponds to the area-weighted average of all the overall R-values which includes all thermal bridging, for all the exterior walls in that zone. Refer to MNECB Appendix C for the accepted method for calculating overall R-value.

Total Roof Area

The gross surface area of the roof, defined as the opaque roof area plus the areas of any skylights contained in the roof.

Average Roof R-value

The R-value is the area-weighted average of all the overall R-value which includes all thermal bridging, for all the roofs in that zone. Refer to MNECB Appendix C for the accepted method for calculating overall R-value.

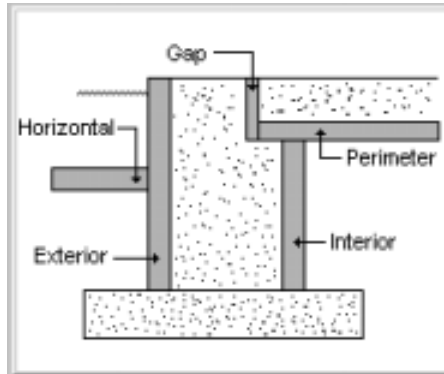
Floor-on-ground area

The floor-on-ground area includes any floor area that is in contact with the ground. Rules on how to consider below ground floors and walls are presented in the “*Special Cases and Workarounds*” section of this guide.

Floor-on-ground Insulation Type

The level of insulation for floor-on-ground must be selected from a drop-down menu. The following diagram illustrates the meaning of each of the insulation placement referred to in that list.

Figure 6: Floor-on-ground insulation placement



NOTE: Insulation levels for floor-on-grounds does not give rise to any CBIP credits but are subjects to mandatory requirements in the MNECB.

3.2 Windows and Doors

Defining windows in EE Wizard consists in entering their gross area, including framing, and their orientations and types from drop-down menus.

NOTE: The sum of all windows area and door area cannot exceed the *Total Exterior Wall area* for the zone.

It is not possible to define skylights or non-vertical glazing elements.

The characteristics of the windows in the pre-defined list are provided in Table 1.

Table 1: Windows characteristics

Window Type	U-value W/(m ² -K) / BTUH/(ft ² -°F)	SHGC
Standard double/Vinyl	2.84/0.50	0.52
Standard double/Alum	3.22/0.57	0.61
Standard low-e/Vinyl	2.15/0.38	0.28
Standard low-e/Alum	2.50/0.44	0.33

Only one type of door can be defined in each zone. The total exterior door area is the sum of all opaque doors in that zone. Opaque doors are defined as doors with less than 50 % glazing.

Figure 7: Defining Windows and Doors in the RFS Wizard

Home PROJECT : Example
 Account Management CBIP Help << Back To Main Diagram
 Start a New RFS Project
 My Projects
 Change to Imperial Unit of Measurement
 Sign Off !!

ZONE: Food Retail with Display Cases >>

Space Definition Windows & Doors Lighting System Schedules
 Heating & Cooling Ventilation Dehumidification Refrigeration

Windows

Orientation	Area (m ²)	Type
	0.00	Standard double/Vinyl
	0.00	Standard double/Vinyl
	0.00	Standard double/Vinyl
	0.00	Standard double/Vinyl

Up to 4 orientations or window types per zone

Exterior Doors

* Total Exterior Doors Area: 0.00 (m²)
 Type: Insulated Metal

Save Save & Continue >>
 << Save & Go Back

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3.3 Lighting System

EE Wizard only requires three data entry to define a zone's lighting system.

Average Lighting Power Density

The only mandatory element is the average lighting power density (LPD). This LPD is the area-weighted average of the LPD of each spaces comprised in the zone (excludes display case or walk-ins lighting).

Type of Lighting Control

Automatic lighting control strategies can be defined in EE Wizard by selecting from a drop-down menu. Choices range from occupancy control to daylight sensing (DS) control with continuous dimming, multiple step dimming or on/off control. Only one type of control strategy is possible in a zone.

Percentage of Lights Controlled

After defining the type of control strategy used in a zone. The user must specify what percentage of the lights these sensors control. The percentage entered is the power-weighted average of the lights controlled to the total lighting power in the zone (ballasts included).

Figure 8: Defining the Lighting System in the RFS Wizard

Home

Account Management

Start a New RFS Project

My Projects

Change to Imperial Unit of Measurement

Sign Off !!

PROJECT : Example

CBIP Help

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ZONE: Food Retail with Display Cases >>

Space Definition Windows & Doors **Lighting System** Schedules

Heating & Cooling Ventilation Dehumidification Refrigeration

* Average Lighting Power Density : 15.5 (W / m²)

Type of lighting control:
Daylight sensing control (DS)

Fraction of lights controlled: 40.00 %

Area-weighted average

Save Save & Continue >>

<< Save & Go Back

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3.4 Schedule

Each zone in EE Wizard can have its own operating schedule. The user selects a schedule from a drop-down menu of 5 possible schedules. These pre-defined schedules cannot be modified and the closest match for a given zone must be used.

The schedule selected will determine the hourly profiles for lighting use, ventilation and outside air schedule, equipment use and eventual set back periods. The hourly profiles corresponding to each of the predefined schedules are provided in Tables 2 through 6.

The user can also specify the heating and cooling temperature set point for a zone. No limits are established for these set points even though EE Wizard does not account for heat transfer between zones.

If there is no cooling capacity defined in the zone, the cooling set point is ignored and can be left as is.

If heating set back is present in the zone, EE Wizard will automatically reduce the temperature set point by 4 °C according to the temperature schedules shown in Tables 2-6. If cooling control is selected, the cooling temperature set point will be set to 35 °C (95 °F) during unoccupied periods.

The fan schedules in Tables 2 – 6 apply to ventilation, outside air and exhaust fan control.

Figure 9: Defining the Schedules in the RFS Wizard

Home
Account Management
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My Projects
Change to Imperial Unit of Measurement
Sign Off !!

PROJECT : Example
CBIP Help << Back To Main Diagram

ZONE: Food Retail with Display Cases >>

Space Definition	Windows & Doors	Lighting System	Schedules
Heating & Cooling	Ventilation	Dehumidification	Refrigeration

Operating Schedule: 7h to 20h - Retail Type w night stocking ▾

Heating Set Point: 22.00 °C

Heating Setback: Set Back

Cooling Set Point: 24.00 °C

Cooling Control: Stopped

Save Save & Continue >>
<< Save & Go Back

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Table 2: Schedules details - "7h to 20h - Retail Type with night stocking"

	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12	
Occupants																									
Mon - Fri	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.50	0.50	0.70	0.70	0.70	0.70	0.80	0.70	0.50	0.30	0.30	0.10	0.10	0.10	0.10	0.10
Sat	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.50	0.60	0.80	0.90	0.90	0.90	0.80	0.70	0.50	0.20	0.20	0.10	0.10	0.10	0.10	0.10
Sun	0	0	0	0	0	0	0	0	0	0.1	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.2	0	0	0	0	0	0	0
Lighting																									
Mon - Fri	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.50	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.60	0.50	0.40	0.40	0.40	0.40	0.40
Sat	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.50	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.60	0.50	0.40	0.40	0.40	0.40	0.40
Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.50	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Receptacle																									
Mon - Fri	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.5	0.05	0.05	0.05	0.05	0.05
Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.5	0.05	0.05	0.05	0.05	0.05
Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Fans																									
Mon - Fri	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	On	On	On	Off	Off	Off	Off	Off
Sat	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	On	On	On	Off	Off	Off	Off	Off
Sun	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	Off	Off	Off	Off	Off	Off	Off
Cooling																									
Mon - Fri	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB	SB
Sat	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB	SB
Sun	SB	SB	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB	SB
Heating																									
Mon - Fri	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB	SB
Sat	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB	SB
Sun	SB	SB	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB	SB

SB: Set back possible
 NSB: no set back possibility

Table 3: Schedules details - "24/7 - continuous operation"

	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12	
Occupants																									
Mon - Fri	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.20	0.20	0.50	0.50	0.70	0.70	0.70	0.70	0.80	0.70	0.50	0.30	0.30	0.30	0.30	0.30	0.30	0.20
Sat	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.20	0.20	0.50	0.50	0.70	0.70	0.70	0.70	0.80	0.70	0.50	0.30	0.30	0.30	0.30	0.30	0.30	0.20
Sun	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.20	0.20	0.50	0.50	0.70	0.70	0.70	0.70	0.80	0.70	0.50	0.30	0.30	0.30	0.30	0.30	0.30	0.20
Lighting																									
Mon - Fri	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Sat	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Sun	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Receptacle																									
Mon - Fri	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.05
Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.5	0.05	0.05	0.05	0.05
Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.05	0.05	0.05	0.05	0.05	0.05
Fans																									
Mon - Fri	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On
Sat	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On
Sun	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On
Cooling																									
Mon - Fri	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB
Sat	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB
Sun	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB
Heating																									
Mon - Fri	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB
Sat	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB
Sun	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB

SB: Set back possible
 NSB: no set back possibility

Table 4: Schedules details - "7h to 18h - Warehouse Type"

	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12	
Occupants																									
Mon - Fri	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.70	0.90	0.90	0.90	0.90	0.90	0.50	0.90	0.80	0.80	0.20	0.00	0.00	0.00	0.00	0.00	0.00
Sat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.20	0.20	0.10	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lighting																									
Mon - Fri	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.40	0.70	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.40	0.05	0.05	0.05	0.05	0.05
Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.50	0.90	0.90	0.90	0.90	0.90	0.90	0.70	0.50	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Receptacle																									
Mon - Fri	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.40	0.70	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.40	0.05	0.05	0.05	0.05	0.05
Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.50	0.90	0.90	0.90	0.90	0.90	0.90	0.70	0.50	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Fans																									
Mon - Fri	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	On	On	Off	Off	Off	Off	Off	Off
Sat	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	Off	Off	Off	Off	Off	Off	Off
Sun	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Cooling																									
Mon - Fri	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB	SB	SB
Sat	SB	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB	SB	SB	SB
Sun	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
Heating																									
Mon - Fri	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB	SB	SB
Sat	SB	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB	SB	SB	SB
Sun	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB

SB: Set back possible

NSB: no set back possibility

Table 5: Schedules details - "6h to 20h - Office Type"

	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12	
Occupants																									
Mon - Fri	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.70	0.90	0.90	0.90	0.50	0.50	0.90	0.90	0.90	0.70	0.30	0.10	0.10	0.10	0.10	0.10	0.00	0.00
Sat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lighting																									
Mon - Fri	0.05	0.05	0.05	0.05	0.05	0.05	0.30	0.80	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.50	0.30	0.30	0.10	0.10	0.10	0.05	0.05
Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Receptacle																									
Mon - Fri	0.20	0.20	0.20	0.20	0.20	0.20	0.30	0.80	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.50	0.30	0.30	0.30	0.20	0.20	0.20	0.20
Sat	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Sun	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Fans																									
Mon - Fri	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	Off	Off	Off	Off
Sat	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Sun	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
Cooling																									
Mon - Fri	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB
Sat	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
Sun	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
Heating																									
Mon - Fri	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB	SB	SB	SB
Sat	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
Sun	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB

SB: Set back possible

NSB: no set back possibility

Table 6: Schedules details - "8h to 23h - Retail w night stocking"

	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12	
Occupants																									
Mon - Fri	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.50	0.50	0.70	0.70	0.70	0.80	0.80	0.70	0.50	0.30	0.30	0.30	0.30	0.30	0.30	0.10
Sat	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.50	0.60	0.80	0.90	0.90	0.80	0.80	0.70	0.50	0.20	0.20	0.10	0.10	0.10	0.10	0.10
Sun	0	0	0	0	0	0	0	0	0	0.1	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.2	0	0	0	0	0	0	0
Lighting																									
Mon - Fri	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.50	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.60	0.50
Sat	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.50	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.60	0.50	0.40	0.40	0.40	0.40	0.40
Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.50	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Receptacle																									
Mon - Fri	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.5	0.05
Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.5	0.05	0.05	0.05	0.05	0.05
Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Fans																									
Mon - Fri	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	Off
Sat	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	Off
Sun	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	Off	Off	Off	Off	Off	Off	Off
Cooling																									
Mon - Fri	SB	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB
Sat	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB
Sun	SB	SB	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB
Heating																									
Mon - Fri	SB	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB
Sat	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB
Sun	SB	SB	SB	SB	SB	SB	SB	SB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	NSB	SB

SB: Set back possible

NSB: no set back possibility

3.5 Heating and Cooling

EE Wizard simplifies the definition of the mechanical system by setting up most of its parameters and by predetermining the systems type. The user must then define the system's heating and cooling capacity capacities, heating source, and any terminal or baseboard heating used in a zone.

The different heating and cooling systems, and their equivalent, defined by EE Wizard for the RFS zones are:

- 1- Warehouse/Storage zone: Unit heaters/force flow heaters/duct heaters with possible baseboards and no cooling, fresh air from a make-up air unit OR roof-top unit with possibility of cooling
- 2- Food retail with Display Cases zone: Roof top unit(s) with cooling and dehumidification (3 types of dehumidification as presented later on) and possibility of baseboards.
- 3- Store Front/Cashiers zone: Roof top unit(s) with cooling and possibility of baseboards (or unit heaters).
- 4- Offices zone: Roof top unit(s) with cooling and possibility of baseboards.
- 5- Non-food retail zone: Roof top unit(s) with cooling and possibility of baseboards.

All roof-top units described above are single-zone/constant-volume packaged units. A combination of furnace or boiler and air-conditioner can also be treated as equivalent to one of these RTU as long as the system brings in the minimum outside air required by MNECB.

All RTUs are equipped with a dry bulb controlled economizer in the Proposed building. This configuration cannot be modified.

Similar to the assignation of a RFS's actual spaces to those in EE Wizard, the user will have to assign actual systems of a RFS project to those in EE Wizard. Some general guidelines on how to assign actual systems to the pre-established EE Wizard systems are provided in the *User's Tips* section.

Figure 10: Defining the Heating&Cooling System in the RFS Wizard

Home
Account Management
Start a New RFS Project
My Projects
Change to Imperial Unit of Measurement
Sign Off !!

PROJECT : Example
CBIP Help << Back To Main Diagram

ZONE: Food Retail with Display Cases >>

Space Definition Windows & Doors Lighting System Schedules
Heating & Cooling Ventilation Dehumidification Refrigeration

Total installed capacity

Heating System

* Central Baseboard
Capacity: (kW) (kW)
Source:
Heating Efficiency: % Same as Central

Cooling System

* Capacity: (kW)
* Cool Efficiency (COP): (W/W)

Save Save & Continue >>
<< Save & Go Back

Heating Efficiency

This value refers to the instantaneous efficiency and not the annual fuel utilization efficiency (AFUE).

3.6 Ventilation

The second part of defining the mechanical system involves describing its ventilation components.

Supply fan

The first set of entries serves to describe the supply fan(s). The supply system is described by the total air flow assigned to the zone, its design static pressure and the combined fan/motor efficiency. If multiple fans serve the zone, the flow is the summation of all air flows from each fan.

The static pressure is set by default identical to that of the reference building at 325 Pa/1.3 in. wg. For multiple fans, the static pressure is calculated as the flow-weighted average of all fan static pressure.

EE Wizard does not allow defining a return fan system.

Outside air

Two entries serve in defining the outside air flow to a zone: the total design outside air flow rate and the total local exhaust flow rate.

The value entered for the total design outside air flow rate must be greater than that specified by the MNECB for CBIP Compliance. Also, the amount of local exhaust should be smaller or equal to the specified total design outside air flow rate. If the total outside air flow rate is below that required by MNECB, the Wizard will perform the simulation but the Compliance Report will indicate an error and will not be for CBIP Compliance.

If a heat recovery ventilator (HRV) is present on the ventilation system, its effectiveness must be specified here (entered in term of %). The increased static pressure drop due to an HRV must be included in the ventilation system design static pressure defined earlier. Whenever heat recovery is specified, it is important to know that all local exhaust is rejected directly to the outside, by-passing the HRV. Whenever local exhaust are ducted back to the HRV, these exhaust must not be defined and should only be considered in the total design outside air flow value.

Intermittent exhaust should only be defined in proportion of their actual usage compared to that presented in the schedules of Table 2 through 6.

Figure 11: Defining the Ventilation System in the RFS Wizard

Home PROJECT : Example << Back To Main Diagram
 Account Management CBIP Help
 Start a New RFS Project
 My Projects
 Change to Imperial Unit of Measurement
 Sign Off !!

ZONE: Food Retail with Display Cases >>

Space Definition Windows & Doors Lighting System Schedules
 Heating & Cooling Ventilation Dehumidification Refrigeration

Supply Fan
 * Total Air Flow Rate: (L/s)
 Design Static Pressure: (Pa)
 Combined Motor/Fan Efficiency: %

Outside Air
 * Total Outside Air Flow Rate: *Requires floor area to be defined (Space Definition)*
 * Total Local Exhaust Flow Rate: (L/s)
 Heat Recovery Ventilator Efficiency: %

Must meet MNECB minimum for compliance

Save Save & Continue >>
 << Save & Go Back

For all OEE Internet related inquiries, please contact the Administrator [Back to top ↗](#)

Dehumidification

Only the *Food Retail with Display Cases* zone offers the possibility of defining dehumidification. This is attributable to the potentially significant impact that high humidity levels can have on the display cases energy use. Other zones follow CBIP rules, which do not allow credits for dehumidification.

For the *Food Retail with Display Cases* zone, three possible dehumidification systems can be defined:

- Dehumidification using the roof-top unit
- Dehumidification using a dual-path system (fresh air dehumidification only)
- Desiccant dehumidification

Whenever a dehumidification system is defined in the Proposed design, the Reference building will have dehumidification based on its roof-top unit. The minimum set point allowed in the Reference building is 40 % RH (relative humidity). If the proposed building has a set point lower than 40%, the Reference will remain at 40 % otherwise it will adopt the same as that of the Proposed.

Figure 12: Defining the Dehumidification System in EE Wizard

Home

PROJECT : Example

Account Management

Start a New RFS Project

My Projects

Change to Imperial Unit of Measurement

Sign Off !!

CBIP Help

<< Back To Main Diagram

ZONE: Food Retail with Display Cases >>

Space Definition Windows & Doors Lighting System Schedules

Heating & Cooling Ventilation Dehumidification Refrigeration

Space has dehumidification

System Definition

Control Set Point: %

Type:

Save Save & Continue >>

<< Save & Go Back

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3.8 Refrigeration

Two zones allow defining refrigeration equipment: the *Warehouse/storage* zone and the *Food Retail with Display Cases* zone.

The data entry for the refrigeration equipment for these two zone differ

largely. The Warehouse/Storage zone is used exclusively to define cold storage rooms and walk-ins whereas the Food Retail with Display Cases zone can only be used to define display cases.

3.8.1 Walk-ins

Walk-ins and cold storage rooms must be defined in the Warehouse/storage zone. Two type of walk-ins are available: low temperature (walk-in freezers) and medium temperature (walk-in coolers). Low temperature walk-ins correspond to all those having a temperature of 15 °F or less.

Defining a walk-in requires specifying its floor area, the sum of the wall areas for all exposed walls to the zone, average R-value of the walls, lighting power density and evaporator fan power density.

The various control options and refrigeration equipment characteristics also need to be defined, as shown in Figure 14. These characteristics must be defined separately for each type of walk-in.

Heat recovery can be defined in two different manners. The simplest way is to select the level of heat recovery for each temperature level from the drop-down menus. However, this method is only to be used for non-compliance and preliminary runs. For compliance purposes, the heat recovery must be specified by entering the selected heat recovery coil capacity. This capacity is for both temperature levels. The energy recovered by this coil can only be for space heating of the Warehouse/Storage zone. A more detailed description of the various control and energy efficiency options for refrigeration equipment is provided later on.

If some walk-ins have service doors in the Food Retail section for customers access, this accessible section must be defined as display cases (such as Class 4 display cases). The interior portion, past the shelf depth, must then be defined as a walk-in in the Warehouse/Storage zone.

Figure 13: Defining the Walk-ins in EE Wizard

Home PROJECT : Example << Back To Main Diagram
CBIP Help

Account Management

Start a New RFS Project

My Projects

Change to Imperial Unit of Measurement

Sign Off !!

ZONE: Warehouse/Storage >>

Space Definition Windows & Doors Lighting System Schedules
Heating & Cooling Ventilation Refrigeration

Refrigeration (Walk-In) 1 of 2

Walk-In Refrigeration Data

Walk-in Coolers Area: (m²)

Walk-in Cooler Walls: (m²)

Walk-in Coolers Wall R-value:

Walk-in Freezers Area: (m²)

Walk-in Freezers Walls: (m²)

Walk-in Freezers Wall R-Value:

Lights and Fans

	Lights	Fans
Walk-in Cooler:	<input type="text"/> (W / m ²)	<input type="text"/> (W / m ²)
Walk-in Freezer:	<input type="text"/> (W / m ²)	<input type="text"/> (W / m ²)

Refrigeration (Walk-In) 1 of 2

Save Save & Continue >>
<< Save & Go Back

Evaporator fans

Figure 14: Defining the Walk-ins in the EE Wizard

Home

Account Management

Start a New RFS Project

My Projects

Change to Imperial Unit of Measurement

Sign Off !!

PROJECT : Example

CBIP Help << Back To Main Diagram

ZONE: Warehouse/Storage >>

Space Definition

Windows & Doors

Lighting System

Schedules

Heating & Cooling

Ventilation

Refrigeration

Refrigeration (Walk-In) 2 of 2

Walk-in Light Controls

Low Temperature: Medium Temperature:

Walk-in Defrost Controls

Low Temperature: Medium Temperature:

Equipment

	Low Temperature	Medium Temperature
Compressor EER: (Btu / h - W)	<input type="text"/>	<input type="text"/>
Defrost Type:	<input type="text" value="Electric"/>	<input type="text" value="Electric"/>
Heat Recovery Type:	<input type="text" value="None"/>	<input type="text" value="None"/>

Walk-in Floating head pressure.

Walk-in Mechanical subcooling

Total heat recovery coil capacity: (kW)

Refrigeration (Walk-In) 2 of 2

Save

Save & Continue >>

<< Save & Go Back

NOT for compliance runs

3.8.2 Display Cases

Display cases of all types can only be defined in *Food Retail with Display Cases* zone. The basic input required to define display cases is the length of each case type as defined by CSA standard C657-95. The different types of cases are illustrated in figures 16 to 23. A short description of each type is also provided below.

Users must take particular care in verifying that the temperature levels of their display cases match that of the classes offered in the Wizard. The following temperature level are considered representative of each of the three possible levels:

- Low temperature: -22 °F evaporating
- Medium temperature: 12 °F evaporating
- High temperature: 33 °F evaporating

The Wizard does not allow changing these temperatures. Thus, the closest level must be selected for a specific type of cases.

Class 1 – a low-temperature multideck, self-service cabinet with two or more parallel air curtains, where the plane of the air curtains is either vertical or within 25° of vertical, and the length of the air curtain is between 1.00 and 1.30 m (39 and 51 in). See Figure 16.

Class 2 – a medium-temperature multideck, self-service cabinet with a single air curtain, where the plane of the air curtain is either vertical or within 25° of vertical, and the length of the air curtain is between 1.00 and 1.50 m (39 and 59 in). The cabinet height is between 1.90 and 2.10 m (75 and 83 in) and the cabinet depth is between 0.80 and 1.20 m (32 and 47 in). See Figure 17.

Class 3 – a medium-temperature multideck, self-service cabinet with a single air curtain, where the plane of the air curtain is between 30 and 60° of vertical, and the length of the air curtain is between 0.80 and 1.00 m (32 and 39 in). The cabinet height is between 1.00 and 1.40 m (39 and 55 in) and the cabinet depth is between 1.00 and 1.20 m (39 and 47 in). See Figure 18.

Class 4 – a low- or medium-temperature closed multideck self-service cabinet with a single vertical air curtain behind glass doors. The cabinet height is between 2.00 and 2.10 m (79 and 83 in) and the cabinet depth is between 1.00 and 1.20 m (39 and 47 in). See Figure 19.

Class 5 – a low-temperature well-type self-service cabinet, open or closed, with a horizontal, or close-to-horizontal air curtain, and a product

loading depth between 0.30 and 0.45 m (10 and 18 in). The length of the air curtain in normal cabinets is between 0.75 and 0.85 m (30 and 33 in) and in wide cabinets is between 1.00 and 1.20 m (39 and 47 in). Jumbo island cabinets are considered as two normal units back-to-back. See Figure 20.

Class 6 – a medium-temperature single deck self-service cabinet with a single air curtain, where the plane of the air curtain is between 2 and 20° of horizontal, and the length of the air curtain is between 0.75 and 0.90 m (30 and 35 in). The cabinet height is between 0.80 and 1.00 m (32 and 39 in) at the back and 0.70 and 0.90 m (28 and 35 in) at the front and the cabinet depth is between 1.00 and 1.20 m (39 and 47 in). See Figure 21.

Class 7 – a high-temperature single deck wall or island-type self-service cabinet, with or without a nonrefrigerated superstructure, with a perforated product shelf (screen shelf) directing the air flow through the products (as opposed to the air curtain arrangement), with a product display area width of 0.75 to 1.55 m (30 to 61 in). Class 7 cabinets are divided into three subclasses on the basis of the width of the product display area:

- (a) narrow- 0.75 to 1.02 m (30 to 40 in);
- (b) medium- 1.03 to 1.27 m (41 to 50 in); or
- (c) wide -1.28 to 1.65 m (51 to 65 in).

See Figure 22.

Class 8 – a low- or high-temperature service cabinet with flat or curved front glass, and sliding door service access at the back. The height of the cabinet is between 1.25 and 1.40 m (49 and 55 in), and the depth of the cabinet is between 0.95 and 1.20 m (35 and 47 in). Service cabinets are divided into two subclasses on the basis of the evaporator coil arrangement:

- (a) gravity coil; and
- (b) fan coil.

See Figure 23.

Figure 15: Defining the Display Cases in the RFS Wizard

Account Management CBIP Help << Back To Main Diagram

Start a New RFS Project

My Projects

Change to Imperial Unit of Measurement

Sign Off !!

ZONE: Food Retail with Display Cases >>

Space Definition Windows & Doors Lighting System Schedules

Heating & Cooling Ventilation Dehumidification Refrigeration

Refrigeration (Display Cases) 1 of 3

Display Cases Data	Length
Class 1- low-temp multideck:	<input type="text" value="0.00"/> (m)
Class 2- medium-temp multideck (dairy):	<input type="text" value="0.00"/> (m)
Class 3- medium-temp multideck (meat):	<input type="text" value="0.00"/> (m)
Class 4a- low-temp closed multideck:	<input type="text" value="0.00"/> (m)
Class 4b- medium-temp closed multideck:	<input type="text" value="0.00"/> (m)
Class 5- low-temp well-type (open or closed):	<input type="text" value="0.00"/> (m)
Class 6- medium-temp single deck:	<input type="text" value="0.00"/> (m)
Class 7a- high-temp single deck island-type (wide):	<input type="text" value="0.00"/> (m)
Class 7b- high-temp single deck island-type:	<input type="text" value="0.00"/> (m)
Class 8a- low-temp service cabinet (fan coil):	<input type="text" value="0.00"/> (m)
Class 8b- medium-temp service cabinet (fan coil):	<input type="text" value="0.00"/> (m)
Class 8c- high-temp service cabinet (gravity coil):	<input type="text" value="0.00"/> (m)

Refrigeration (Display Cases) 1 of 3

Insure that the correct temperature level is selected

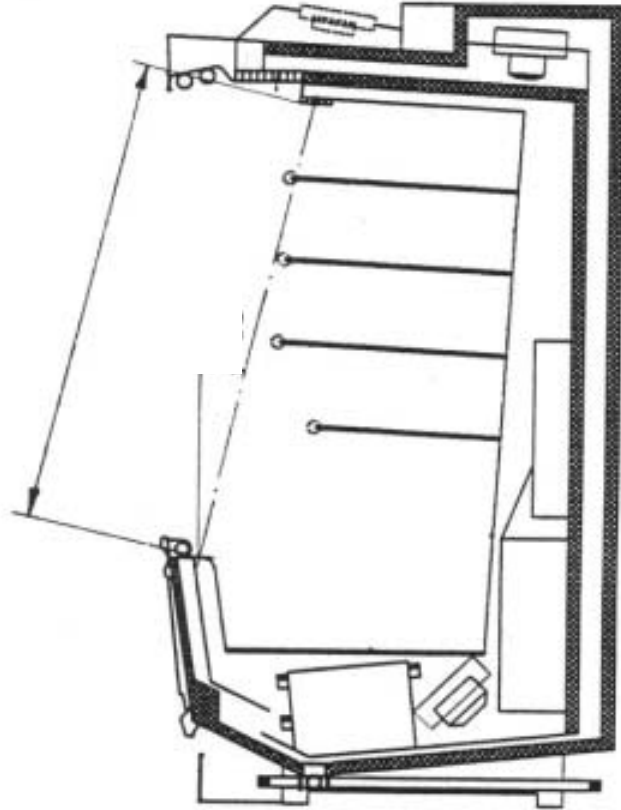


Figure 16: Class 1 type display cases

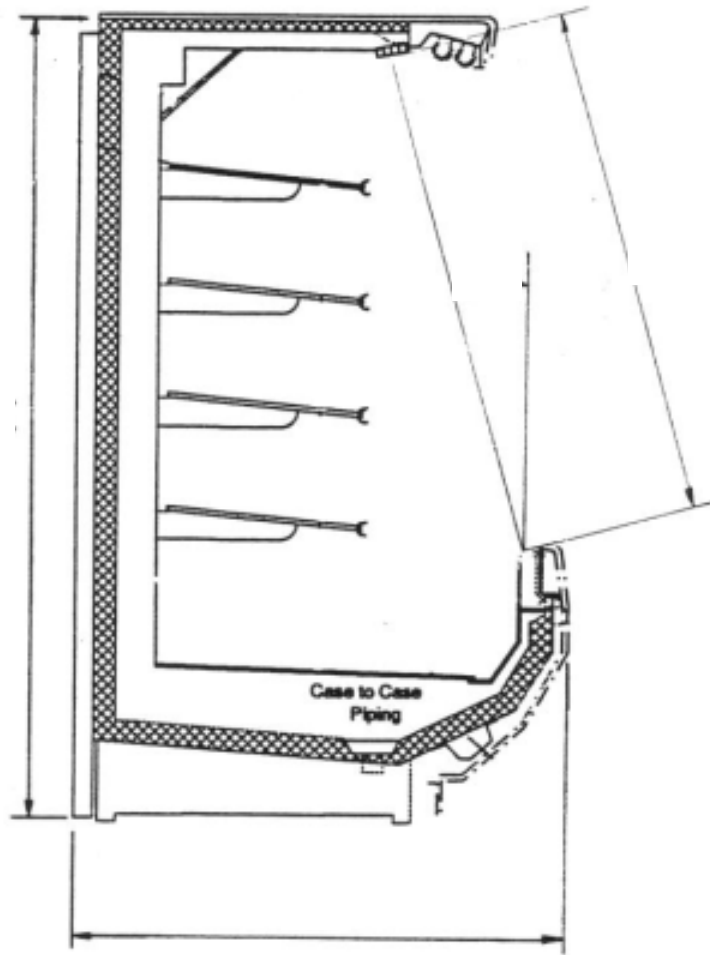


Figure 17: Class 2 type display cases

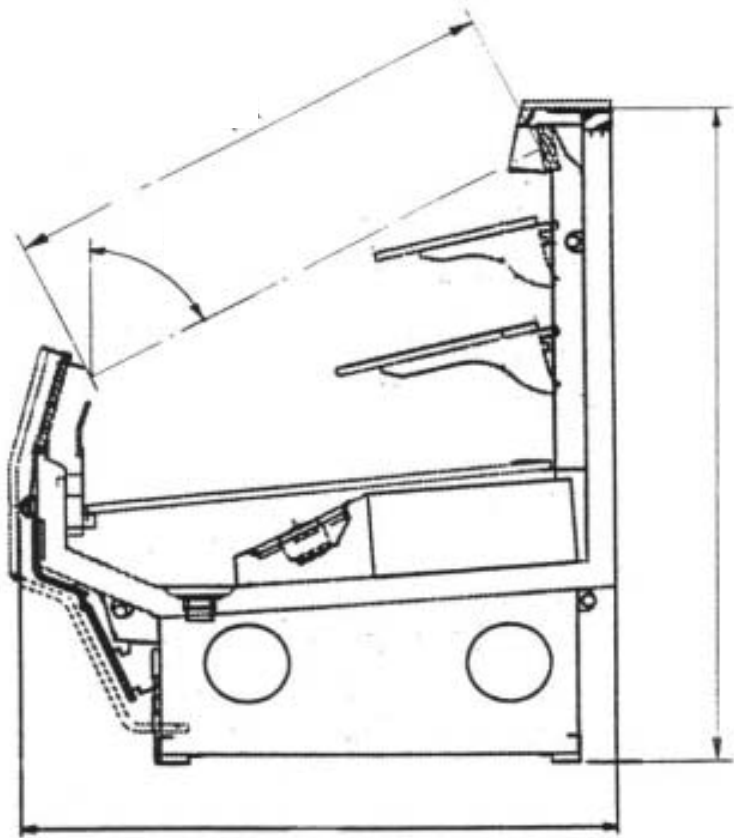


Figure 18: Class 3 type display cases

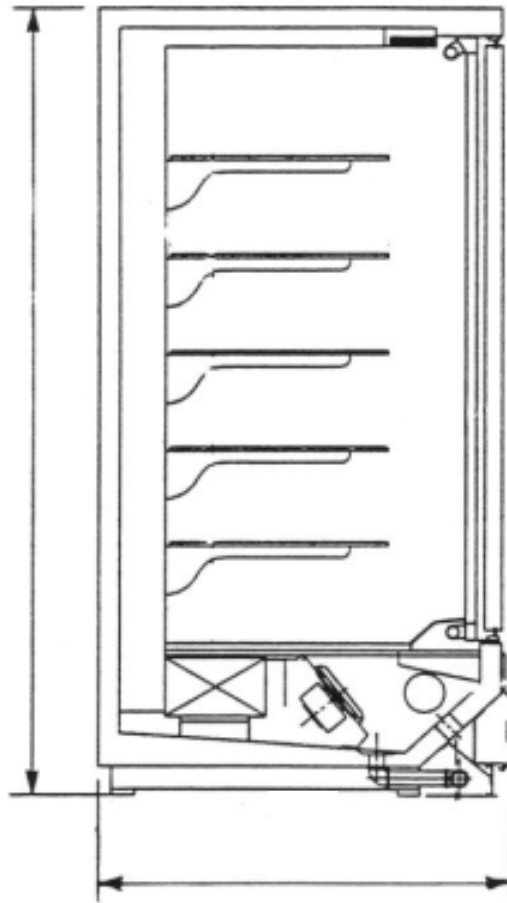


Figure 19: Class 4 type display cases

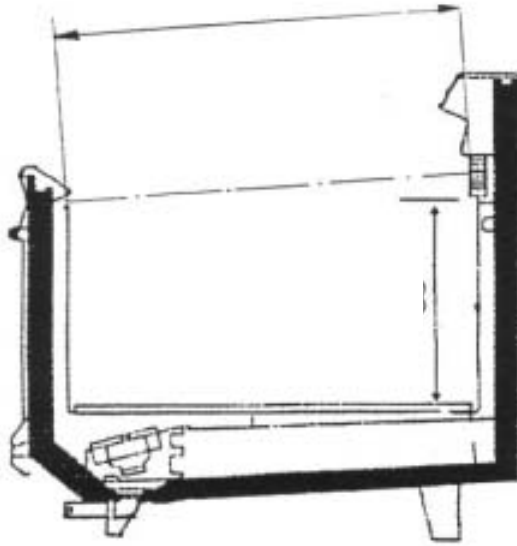


Figure 20: Class 5 type display cases

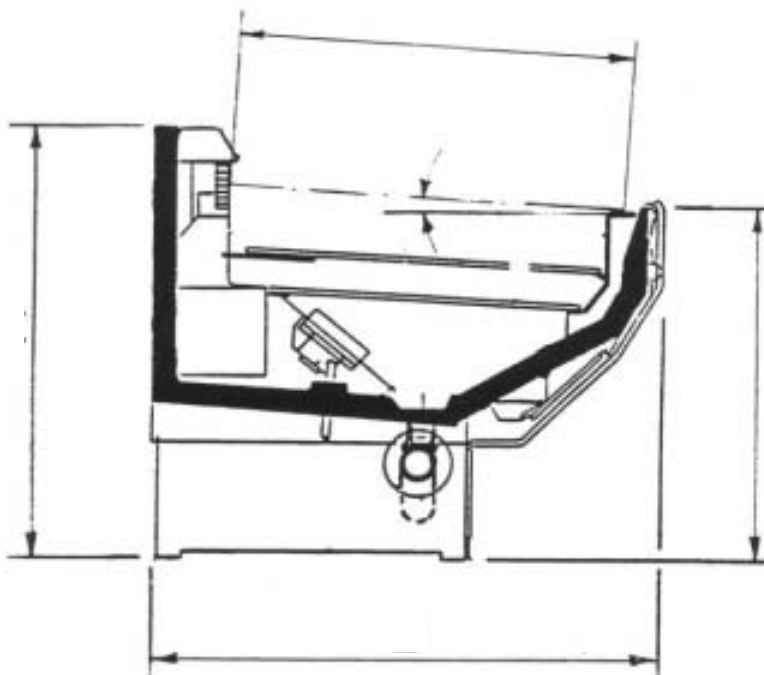


Figure 21: Class 6 type display cases

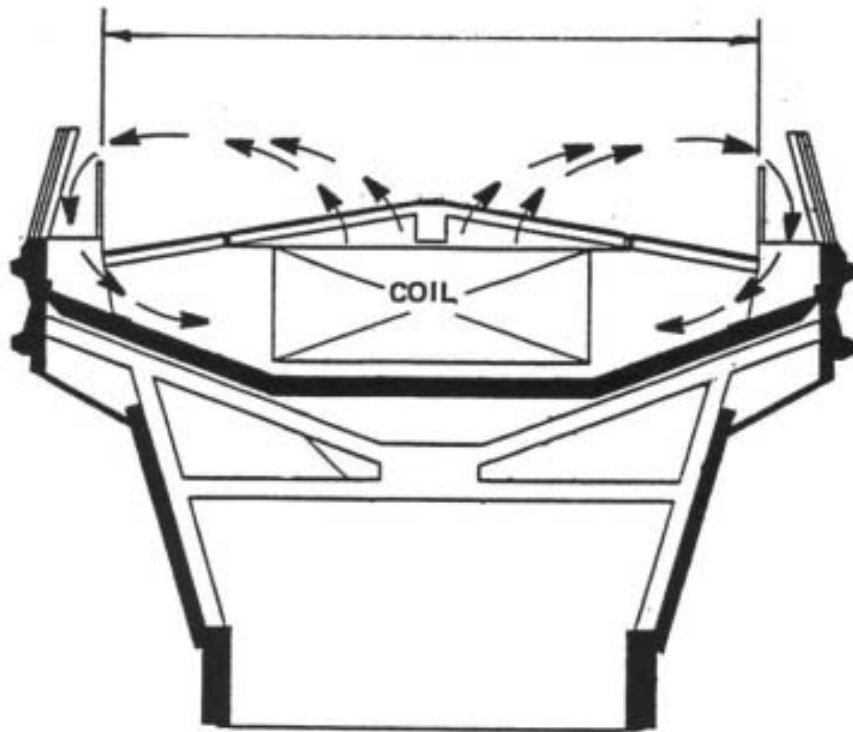


Figure 22: Class 7 type display cases

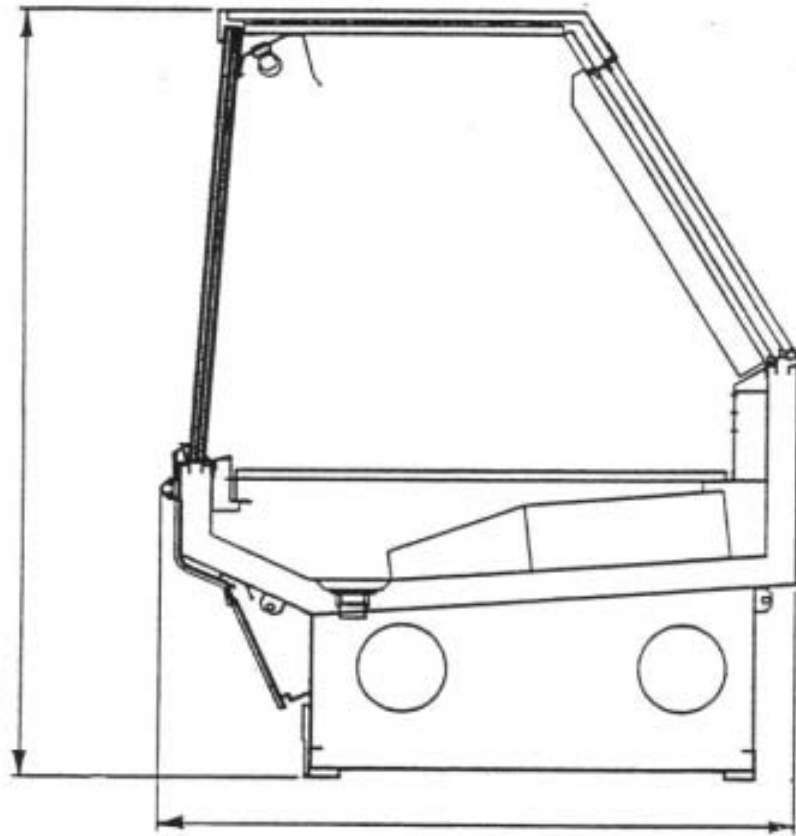


Figure 23: Class 8 type display cases

The next step in defining the display cases is to enter the internal, or auxiliary loads, present in the cases. The Wizard allows the user to define the amount of lighting, fan power and anti-sweat power installed in each type of cases. These values are all expressed in terms of display cases unitary length. Whenever two display cases of the same type have differing unitary characteristics, the length-weighted average of the characteristics must be used.

These input may be used in defining energy efficiency measures, namely:

- High efficiency evaporator fans/motors,
- High efficiency lighting system,
- Optimized anti-sweat capacity.

Additional energy efficiency measures can also be specified when defining the refrigeration equipment and control strategies, as illustrated in Figure 24. For example, to take full advantage of the dehumidification system, the user may select to have a proportional-type control of the anti-sweat heaters or have thermostatically terminated defrost. The reference building has predefined settings for all these control options. These settings are described in Appendix B of this guide.

Figure 24: Defining the Display Cases in the RFS Wizard – Details

Change to Imperial
Unit of Measurement

Sign Off !!

Refrigeration (Display Cases) 2 of 3

Display Cases Data	Lights (W/m)	Fans (W/m)	Anti-sweat (W/m)
Class 1- low-temp multideck:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Class 2- medium-temp multideck (dairy):	<input type="text"/>	<input type="text"/>	<input type="text"/>
Class 3- medium-temp multideck (meat):	<input type="text"/>	<input type="text"/>	<input type="text"/>
Class 4a- low-temp closed multideck:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Class 4b- medium-temp closed multideck:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Class 5- low-temp well-type (open or closed):	<input type="text"/>	<input type="text"/>	<input type="text"/>
Class 6- medium-temp single deck:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Class 7a- high-temp single deck island-type (wide):	<input type="text"/>	<input type="text"/>	<input type="text"/>
Class 7b- high-temp single deck island-type:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Class 8a- low-temp service cabinet (fan coil):	<input type="text"/>	<input type="text"/>	<input type="text"/>
Class 8b- medium-temp service cabinet (fan coil):	<input type="text"/>	<input type="text"/>	<input type="text"/>
Class 8c- high-temp service cabinet (gravity coil):	<input type="text"/>	<input type="text"/>	<input type="text"/>

Refrigeration (Display Cases) 2 of 3

Figure 25: Defining the Display Cases in the RFS Wizard – EE Measures

Change to Imperial
Unit of Measurement

Sign Off !!

Refrigeration (Display Cases) 3 of 3

Display Case Light Controls

Low **Medium**

Always on Always on

High

Always on

Display Case Defrost Controls

Low **Medium** **High**

On timer On timer On timer

Display Case Equipment

Low **Medium** **High**

Compressor EER:
(Btu / h - W)

Defrost Type: Electric Electric Electric

Heat Recovery Type:

Low: None **Medium:** None **High:** None

Anti-Sweat Controls:

Low **Medium**

Always on Always on

High

Always on

Display Case Floating head pressure.

Display Case Mechanical subcooling

Total heat recovery coil capacity: 0.00 (kW)

Refrigeration (Display Cases) 3 of 3

4. Defining Retail Food Store Reference Building

A series of additional compliance rules were necessary in order to integrate RFS to CBIP. These rules serve in defining the Reference building and, at the same time, indicate where additional CBIP credits can be obtained.

The rules for RFS are presented in Appendix B of this guide. It should be noted that all other CBIP rules also apply to RFS, including the “Performance

Compliance for Buildings – Specifications for Calculation Procedures for Demonstrating Compliance to the Model National Energy Code for Buildings Using Whole Building Performance” [Canadian Commission on Building and Fire Codes (CCBFC), May 1999].

5. CBIP Submission Procedure using EE Wizard

Submitting a RFS project to CBIP follows basically the same step as that for a standard Performance Path submission, as described in the CBIP Technical Guide.

The initial steps consists in obtaining an Expression of Interest (EOI) number. The next step requires gathering all the information needed to complete a EE Wizard run, although intermediate and preliminary runs can be performed to guide the design.

Once the design is complete and all information collected, a final EE Wizard run is performed and the CBIP Compliant report is downloaded by the Applicant. The report needs to be printed for eventual signing and submission to CBIP with all other required documents (refer to Performance Path Worksheet of the CBIP Technical Guide).

Final runs and accompanying data **MUST** always be saved in the Applicant’s Web account.

6. Energy Efficiency Measures Available through EE Wizard for RFS

6.1 Building Envelope

EE Wizard offers potential credits for improved envelopes compared to the MNECB prescriptive values for the region specified (as stated in Appendix A of MNECB). Thus, similarly to what is offered by EE4, the user can specify higher wall, roof and window R-values. Note that the windows R-values are pre-established.

Windows in the Reference building will always have the same solar heat gain coefficient (SHGC) and the same orientation as those in the Proposed building.

6.2 Lighting

Lighting credits are available whenever the proposed building as a lower LPD than the Reference building. The values for LPD in EE Wizard RFS are given in Table 7.

Table 7: LPD in the Reference RFS building

Zone	Lighting Power Density (W/m ²)
Warehouse/Storage	10.8
Food Retail with Display Cases	30.0
Non-food Retail	35.5
Store Front/Cashiers	30.0
Office	19.4

Additional credits can be obtained through the use of automatic controls. The Reference building does not have any kind of automatic control. The credits for each type of control can be translated in a reduction in LPD for the proposed building, for the fraction where the control is applied, as per Table 8.

Table 8: LPD reduction for each automatic control strategy

Control Type	LDP credit
Daylight sensing control (DS) - continuous dimming	30 %
DS - multiple step dimming	20 %
DS - ON/OFF	10 %
Occupancy sensor	30 %
Occupancy sensor and DS - continuous dimming	40 %
Occupancy sensor and DS - multiple step dimming	35 %
Occupancy sensor and DS - ON/OFF	35 %

6.3 Mechanical System

CBIP Credits for the mechanical system are basically the same as those available for the standard Performance Path method, with the significant exception concerning the impossibility to modify the basic mechanical system (RTUs or equivalents).

However, credits for HRVs, high efficiency mechanical cooling, high efficiency heating (fuel-fired units), and high efficiency supply fans are all available. Furthermore, as will be seen in the refrigeration section, significant credit can also be obtained from refrigeration heat recovery for space heating purposes.

The Reference building will always have a 80% efficiency fuel-fired heating system (if Proposed if fuel-fired), a 40 % combined fan/motor efficiency with 325 Pa/1.3 in wg static pressure and a cooling system with

COP of 3.4. The Reference building has no HRV but a desuperheating refrigeration heat recovery coil (described later).

6.4 Dehumidification

As mentioned in the Dehumidification Section of the Step-by-Step presentation of EE Wizard, special credits are available for RFS regarding dehumidification. These credits are only available for the *Food Retail with Display Cases* zone. Whenever the Proposed building has dehumidification, the Reference building will also have dehumidification but using its roof-top unit (see Additional Rules in Defining RFS Reference Buildings section).

By selecting a desiccant dehumidification system or a dual-path system, the Applicant may benefit from significant CBIP credits.

Dual-path allow controlling humidity levels by cooling only the outdoor air instead of the entire ventilation air, as is the case for the conventional roof-top unit set up. Doing so limits the amount of reheating required after the dehumidification cooling process. Furthermore, the dual-path is usually specifically design for dehumidification, unlike roof-top units, and can better maintain a given humidity set point at a better overall efficiency.

Another alternative to using roof-top units for dehumidification is to employ a desiccant dehumidifier. This system also treat the outside air but uses a special moisture absorbent material to dry the air. Desiccant systems do not require the reheating of RTUs but need to be regenerated (i.e. dry out the desiccant material) usually using a gas-fired system.

Having a more efficient dehumidifying system is only part of the credits that can be gained from dehumidification. Other credits from a better operation of the refrigeration system is also possible as described in the next section.

6.5 Refrigeration

The refrigeration system offers many opportunities for energy efficiency improvements in a RFS. Through EE Wizard, a number of measures are available and provide CBIP credits.

Heat Recovery

A RFS refrigeration system rejects heat all year round. This heat can be used in great part to offset the usually high heating load of the RFS. The relatively high heating load is in good part due to the presence of display cases, which continually cool the sales zone.

Various levels of heat recovery are possible. The more common type is called desuperheating. In this system, the hot refrigerant gas leaving the compressors are sent to a heat exchanger usually located in the main ventilation system. The hot gas is cooled but does not condensate in the heat exchanger. The cooled gas is then directed to the systems condensers for complete condensation. This type of system allows recovering typically between 15 % to 30 % of the total energy in the refrigerant stream.

Another common type of heat recovery is a condensing-type recovery system. In this system, the hot gas from the compressors are sent to the heat exchanger located in the ventilation system where it is cooled and condensed. When the gas fully condenses, the system is termed a full-condensing recovery system. Many designs achieve high levels of condensation but do not get full recovery. An auxiliary condenser is usually needed to insure that liquid refrigerant is always available at the expansion devices.

The reference system has desuperheating heat recovery.

Floating Head pressure control

When the compressors send hot refrigerant gas to the condenser, the pressure in the condenser is usually maintained to a minimum value in order to insure proper operation of the expansion devices. However, keeping a higher condensing pressure requires more work from the compressors. Systems can be design to operate adequately even at low condensing pressures, these systems offer significant energy performance gains. It should be noted that when heat recovery is used, the condensing pressure is maintained higher, even with such systems, in order to allow the heat recovery.

The reference system does not have floating head pressure control.

Mechanical Subcooling

Mechanical subcooling is an effective method of cooling liquid refrigerant below its saturation pressure in order to increase system capacity and improve efficiency. Subcooling the refrigerant increases the cooling capacity and may decrease the compressor power (depending on the subcooling technology), thereby increasing the overall efficiency of the system.

Defrost control

Low and medium temperature display cases need regular defrost periods. The more common type of defrost control is a timer-activated and timer-terminated system. For example, a display case may defrost 5 minutes every half hour. A more efficient system is to have a timer-activated and thermostatic terminated system. In this system, the defrost cycle will only last as long as needed.

Anti-sweat heater control

Anti-sweat heaters are small electrical elements used to prevent water condensation or door freeze-up on display cases. These heaters are often operated continually, regardless of the humidity conditions in the store. Some anti-sweat heaters are controlled on a reduced duty-cycle when the humidity falls below a given set point, such as 50% duty cycle below 50 % RH. More sophisticated controllers continually adjust the anti-sweat heaters power in proportion to the humidity level in the store.

Both of these options offer significant energy efficiency gains and may also help reducing the power demand.

High efficiency display cases

Display cases of all types are available at various efficiency levels. More efficient display cases may have:

- better fans and fan motors
- better anti-sweat control
- reducing lighting power density
- reduced air spillage to the zone
- reduced conductive losses to the zone
- optimum defrost control

When high efficiency display cases are selected in a Proposed design, it must be defined in EE Wizard according to the elements found in the display cases (i.e. defining a lower fan power, lower lighting density, better anti-sweat control, etc.). However, the Wizard does not allow credits for reduced air spillage and reduced convective losses.

Table 9 provides a summary of the Reference building default values for display cases.

Table 9: Reference building Default Values for Display Cases

Display Case CSA Type	Fan power (W/ft)	Lighting power (W/ft)	Zone load ¹ (BTUH/ft)
Class 1	25	20	2087
Class2	25	20	1002
Class 3	25	15	829
Class 4 - low	20	30	447
Class 4 – medium	20	30	174
Class 5	10	0	365
Class 6	10	10	400
Class 7 – wide	20	0	600
Class 7 – narrow	20	0	200
Class 8 – low	20	10	400
Class 8 – medium	20	10	200
Class 8 – gravity	0	10	150

1: Includes conductive, convective and mass transfer

Display cases light control

Lights in display cases create an internal load that must be picked-up by the refrigeration system. Thus, leaving cases lights on at all time (i.e. during off hours) translate into a compounded energy penalty. Whenever possible, turning off the display cases lights during the unoccupied hours, through an automatic system, will result in significant energy savings.

Defrost type

Four options for defrost systems are available for display cases and walk-ins: electric, hot gas, time-off or none. Hot gas defrost represent the more efficient of the systems and should be favored if conditions permits it. It is not uncommon to see manufacturer recommend the use of electric defrost system for certain types of equipment or hybrid systems. EE Wizard does not allow modeling hybrid electric/hot-gas system. In such cases, the defrost system must be selected as electric.

High efficiency Compressors

Refrigeration compressors are characterized by the Energy Efficiency Ratio (EER). EERs are identical to COPs (coefficient of performance) and only their units are different (COP = EER / 3.413). The higher the EER, the more efficient is the compressors.

CBIP credits are available if high efficiency compressors are used in the Proposed design.

7. Special Cases and Workarounds

- Basements: The wizard assumes that all RFS have a slab-on-ground. For cases where there are below ground spaces, a special workaround has been adopted. In such cases, the zone's *Floor area* must include all the conditioned floor area, including that of the below ground space. The ground floor area must also be the sum of all floors in contact with the ground, regardless of their depth. The underground wall area must be included in the *Total exterior wall area*. The *Average exterior wall R-value* must be calculated as the area weighted average of all exterior AND below ground walls R-values. However, the below-ground walls R-value can be estimated as the actual below-ground wall R-value PLUS a value of R-10 to account for the ground insulating and dampening effect.
- Stand-alone refrigeration equipment: In its current version, EE Wizard and CBIP only allow credits for remote-type refrigeration equipment. Any stand-alone system, such as soft drink machines, cannot and must not be defined for a CBIP submission.

8. User's Tips

Spaces assignment guidelines:

- Any spaces with display cases must be assigned to the *Food Retail with Display Cases* zone.
- Center aisles with dry food products area should usually be assigned to the *Food Retail with Display Cases* zone since they often share a common mechanical system.
- Manager office, employees' rooms and restrooms should be assigned to the *Offices* zone, including mezzanines.
- All walk-ins and refrigerated storage spaces must be entered as part of the *Warehouse/Storage* zone.
- The *Store Front/Cashier* zone should be considered separate from the sales zone only if it is served by a separate mechanical system or by its own thermostat.

System assignment guidelines are:

- When multiple units serve a single EE Wizard RFS zone, the total heating and cooling capacity must be entered.
- The equipment efficiency must be defined as a capacity-weighted average of all the units in that zone.
- The fuel source for terminal/baseboard heating cannot be of a combustible-type source unless the central system is also of the same source.
- Baseboard heaters in the Wizard include unit heaters, standard baseboards heaters, duct heaters, or any other heating devices not installed in the RTU.
- Only one central heating source can be chosen. If a zone is served by units with different sources, the source with the greatest energy source adjustment factor (ESAF, see MNECB 1.1.3.2) and representing more than 10% of the installed capacity must be selected.
- When a single unit serves more than one EE Wizard RFS zone, its capacity must be divided between each zone in proportion of their respective thermal loads (not provided by the Wizard).

General tips

- It is generally better to compile all the required data off-line before entering it into the Wizard.
- Using an Excel Spreadsheet, such as the one provided on the Wizard Web Site, can greatly facilitate the data compiling effort and minimize the risks of errors.
- After 30 minutes of inactivity, the Wizard will automatically log you off.

- The Wizard can perform preliminary evaluations even if the final data is not entirely known. This may guide the Applicant in the selection of energy efficiency measures prior to final design.
- Units in EE Wizard can be changed on the fly. Some pages can be filled in SI mode while others in IP.
- When EE Wizard reports an insufficient heating error, there are two possible ways to fix it. Either the heating capacity in the zone must be increased OR the ventilation air flow must be increased to better match the specified heating capacity.

9. Example: Defining a CBIP Compliant RFS in EE Wizard

This example is based on a recently built RFS. The main project's data is presented summarily in this section. All the necessary information to complete an EE Wizard simulation is provided below. Most of this information was available directly from the architectural, mechanical, and electrical drawings. Additional information was obtained from equipment manufacturer standard data sheets (some capacities had to be derived from voltage and amperage specs).

Description

This RFS has a total floor area of 54 000 ft² which includes storage areas, sales area, mezzanines, offices, employees rooms, vestibules and a small bank. The sales area has many services, including hot prepared meals. Walls and roofs are of similar construction throughout the building. The great majority of the building's fenestration is located in the cashiers section.

Total Floor Space (including storage areas, mezzanines...): 54,000 ft²

Walls: R-20

Roof: R-30

Fenestration: Standard insulating glass with aluminium frames

Main Store (Food Retail with Display Cases zone):

This area represents the bulk of the store and serves for food retail. All display cases are located within this space. In the actual design, the space is served by two roof-top units. These two units will be merged into one equivalent unit for modelling purposes. The required data for this zone are presented below while the display case schedule is provided in Table 10. The front end of the store is not included in this zone since it is served by its own roof-top unit and has different thermal loads (due to the windows and the absence of display cases).

Floor area: 38,723 ft²

Exterior walls: 8337 ft²

Roof area: 36500 ft²

Floor-on-ground area: 38723 ft² with R-5 exterior wall insulation

No windows or doors

Lighting: 2.2 W/ft² (no automatic controls)

Schedules: 7h to 20h with night stocking

Heating set point: 71.6 oF

RTU dehumidification with 40 % RH set point

Heating and Ventilation: Heated (natural gas, 86% eff.) and cooled with 2 rooftop units

Natural gas heating: 1,061,268 Btuh

Heat Recovery: 600,000 Btuh from refrigeration system
Cooling: 70 tonnes
Supply air : 26, 566 cfm
Outside air : 8560 cfm
Exhaust: 2825 cfm

Refrigeration:

EER = 4.5 low-temp
EER = 8.5 med and high temp.
Display cases lights off during unoccupied hours
Anti-sweat heater control on 50 % duty cycle
Thermostatic defrost control on low-temp cases
Hot gas defrost on low temp cases
No defrost on high temp
600 000 BTUH heat recovery coil
Floating head pressure system
Mechanical subcooling system

Display cases:

Display cases information was obtained using the display cases schedules along with the manufacturers data sheets. The information on lighting power and fan power had to be derived from volt-amperage data (using a power factor of 95% for lights and 75 % for the standard motors). Each display case was assigned to one of the CSA class using the schematics of figures 16 to 23 and the classes' descriptions. All stand-alone units were ignored, as they are not covered in CBIP for RFS.

Equipment:

Cooking and baking equipment present in this space were ignored, as the current version of EE Wizard does not consider these loads and CBIP do not allow compliance credits for them.

Table 9: Display Cases Schedule

Use	Type	Length (ft)	CSA Class	Temp Level
Ice cream (tombeau congelé)	Remote	37.00	Class 5	LowT
Ice cream (10 doors)	Remote	26.17	Class 4	LowT
Frozen food (10 doors)	Remote	26.17	Class 4	LowT
Frozen food (5 shelves)	Standalone	8.50	Class 1	LowT
Frozen food (well-type)	Remote	37.00	Class 5	LowT
Frozen food (10 portes)	Remote	25.92	Class 4	LowT
Frozen food (10 portes)	Remote	25.92	Class 4	LowT
White wine – dairy type	Remote	8.50	Class 2	MedT
Frozen pastries (4 doors)	Remote	10.75	Class 4	LowT
Frozen meet (28 doors)	Remote	26.17	Class 4	LowT
Viandes congelées (well-type)	Remote	29.00	Class 5	LowT
Viandes congelées (well-type)	Remote	37.00	Class 5	LowT
Frozen food (5 shelves)	Standalone	8.50	Class 1	LowT
Beer (Roll-in)	Remote	32.50	Class 2	MedT
Bakery services	Remote	5.00	Class 8	HiT
Fish (frozen)	Standalone	8.50	Class 1	LowT
Fresh meet	Remote	64.50	Class 3	MedT
Fresh meet (cooked)	Remote	16.50	Class 3	MedT
Produce	Remote	56.50	Class 7	HiT
Deli (salades)	Remote	12.50	Class 6	MedT
Bakery	Remote	16.50	Class 3	MedT
Dairy (Roll-in)	Remote	28.60	Class 2	MedT
Dairy	Remote	36.00	Class 2	MedT
Dairy	Remote	41.00	Class 2	MedT
Dairy	Remote	20.50	Class 2	MedT
Deli (cooked meals)	Remote	29.00	Class 6	MedT
Deli (cold meat)	Remote	29.00	Class 6	MedT
Deli (cold meat)	Remote	29.00	Class 6	MedT
Juices	Remote	24.50	Class 2	MedT
Cheeses	Remote	29.00	Class 6	MedT
Counter (fruits & vegetables)	Standalone	17.00	Class 7	HiT

Store Front (Store Front/Cashiers zone):

This area represents the front section of the store where most of the fenestration is and where the vestibules are. The space is served by one roof-top unit. The required data for this zone are presented below.

Floor area: 7072 ft²
Exterior walls: 2579 ft²
Roof area: 7072 ft²

Floor-on-ground area: 7072 ft² with R-5 exterior wall insulation
Windows: 2113 ft², East (includes the glazed doors since they have more than 50 % glazing).
Lighting: 2.5 W/ft²
Schedules: 7h to 20h with night stocking
Heating set point: 71.6 oF

Heating and Ventilation: Heated (natural gas, 86% eff.) and cooled with 1 rooftop unit
 Natural gas heating: 307,080 Btuh
 No heat recovery
 Cooling: 17.5 tonnes, EER = 11.4
 Supply air : 8, 476 cfm
 Outside air : 1392 cfm
 Exhaust: 0 cfm

Storage Areas (Warehouse/Storage zone):

The storage area includes all the refrigerated-type storage spaces and walk-ins. Unit heaters serve the warehouse, with a small make-up air unit to bring in the required outdoor air. The mechanical system was defined as a central system, similar to a roof-top unit, where the heating capacity is the sum of all capacities in the zone(as long as the same energy source are used). This capacity could also have been assigned to the baseboard without significant change in the energy use. If different energy sources would have been used for the unit heaters and the make-up air unit, then the unit heaters would have been defined as baseboard.

Floor area: 5,210 ft²
Exterior walls: 891 ft²
Roof area: 5,210 ft²
Floor-on-ground area: 5,210 ft² with R-5 exterior wall insulation
Doors: 243 ft², Insulated metal
Lighting: 1.0 W/ft² (no automatic controls)
Schedules: 7h to 18h Warehouse type
Heating set point: 71.6 oF

Heating and Ventilation: Heated (natural gas, 86% eff.) with unit heaters
 Natural gas heating: 203,711 Btuh
 Heat Recovery: 85,000 Btuh from refrigeration system
 Cooling: none
 Supply air : 3,284 cfm (from unit heaters and MAU)
 Outside air : 411 cfm
 Exhaust: 225 cfm

Refrigeration: EER = 4.5 low-temp
EER = 8.5 med temp.
Walk-ins lights off during unoccupied hours
Thermostatic defrost control on low-temp walk-ins (freezers)
Electric defrost
85 000 BTUH heat recovery coil
Floating head pressure system

Walk-ins: 1020 ft² of walk-in freezers and 4047 ft² of walk-in coolers. Wall areas and insulation of 1975 ft²/R-15 and 8122 ft²/R-15 respectively. Lighting power density of 0.87 W/ft² for coolers and 0.92 for freezers. Fan power density of 1.31 W/ft² for coolers and 1.38 for freezers.

Offices:

This last area represents the summation of all the other various spaces used by management and employees (on the mezzanines and main floor). These spaces are served by a small roof-top unit. The required data for this zone are presented below.

Floor area: 1922 ft²
Exterior walls: 5105 ft²
Roof area: 1922 ft²
Floor-on-ground area: 1922 ft² with R-5 exterior wall insulation
Windows: 418 ft², East
85, West
130, South-West
Lighting: 1.8 W/ft²
Schedules: 6h to 20h Office type
Heating set point: 71.6 oF

Heating and Ventilation: Heated (natural gas, 86% eff.) and cooled with 1 rooftop unit
Natural gas heating: 106,319 Btuh
No heat recovery
Cooling: 2.5 tonnes, EER = 11.4
Supply air : 2, 717 cfm
Outside air : 289 cfm
Exhaust: 0 cfm

Screen captures for some of the data entry in EE Wizard for this store are presented in Figures 25 to 43.

The results showed that the store complied with CBIP (run made for Toronto) with a 29.7 % above MNECB result. The same building ran for Vancouver would be at 26.6 %, and at 29 % in Halifax.

Figure 25: Define the Warehouse zone

Home
Account Management
Start a New Project
My Projects
Change to Metric Unit of Measurement
Sign Off !!

PROJECT : Example
CBIP Help << Back To Main Diagram

ZONE: Warehouse/Storage

Space Definition Windows & Doors Lighting System Schedules
Heating & Cooling Ventilation Refrigeration

* Floor Area : 5210.00 (ft²)

Exterior Walls
* Total Exterior Wall Area: 891.00 (ft²)
* Average Exterior Wall R-Value: 20.00 (ft² - h - °F / Btu)

Roof
Total Roof Area: 5210.00 (ft²)
* Average Roof R-Value: 30.00 (ft² - h - °F / Btu)

Floor On-ground
Total Floor Area: 5210.00 (ft²)
Insulation Type:
R-5 (RSI-0.9) exterior wall

Save Save & Continue >>
<< Save & Go Back

Using these to switch tabs cancels any entry made

Identical values used for all zones

Figure 26: Define the Warehouse lighting

Home
Account Management
Start a New Project
My Projects
Change to Metric Unit of Measurement
Sign Off !!

PROJECT : Example
CBIP Help << Back To Main Diagram

ZONE: Warehouse/Storage

Space Definition Windows & Doors Lighting System Schedules
Heating & Cooling Ventilation Refrigeration

* Average Lighting Power Density: 1.00 (W / ft²)
Type of lighting control: None
Fraction of lights controlled: 0.00 %

Save Save & Continue >>
<< Save & Go Back

This project is done in IP (English) units.

Figure 27: Define the Warehouse schedule

Home
Account Management
Start a New Project
My Projects
Change to Metric Unit of Measurement
Sign Off !!

PROJECT : Example
CBIP Help << Back To Main Diagram

ZONE: Warehouse/Storage

Space Definition Windows & Doors Lighting System Schedules
Heating & Cooling Ventilation Refrigeration

Operating Schedule: 7h to 18h - Warehouse Type
Heating Set Point: 71.60 °F
Heating Setback: Set Back
Cooling Set Point: 75.20 °F
Cooling Control: Stopped

Save Save & Continue >>
<< Save & Go Back

This SP has no impact since the zone has no cooling (see Heating\$Cooling Tab)

Figure 28: Define the Warehouse HVAC – Part 1

Home
Account Management
Start a New Project
My Projects
Change to Metric Unit of Measurement
Sign Off !!

PROJECT : Example
CBIP Help

ZONE: Warehouse/Storage

Space Definition | Windows & Doors | Lighting System | Schedules
Heating & Cooling | Ventilation | Refrigeration

Heating System

	Central	Baseboard
Capacity:	203711.00 (Btu/h)	0.00 (Btu/h)
Source:	Natural Gas	
Heating Efficiency:	88.00 %	Same as Central

Cooling System

* Capacity:	0.00 (Btu/h)
* Cool Efficiency (EER):	11.38 (Btu/h - W)

Save | Save & Continue >>
<< Save & Go Back

Sum of all the zone's heating capacity.

High efficiency units (same for all the zones)

No cooling

Figure 29: Define the Warehouse HVAC – Part 2

Home
Account Management
Start a New Project
My Projects
Change to Metric
Unit of Measurement
Sign Off !!

PROJECT : Example
CBIP Help << Back To Main Diagram

ZONE: Warehouse/Storage

Space Definition Windows & Doors Lighting System Schedules
Heating & Cooling Ventilation Refrigeration

Supply Fan
* Total Air Flow Rate: 3284.00 (CFM) *Mostly from unit heaters*
Design Static Pressure: 1.30 (H₂O)
Combined Motor/Fan Efficiency: 40 %

Outside Air
* Total Outside Air Flow Rate: 411.00 (CFM) *Must be higher than 256.4 for CBIP Compliance*
(Min. Value = 256.37 CFM)
* Total Local Exhaust Flow Rate: 225.00 (CFM)
Heat Recovery Ventilator Efficiency: 0 *No HRV (same for all zones)*

Save Save & Continue >>
<< Save & Go Back

Figure 30: Define the Warehouse Refrigeration System – Part 1

Start a New Project

My Projects

Change to Metric Unit of Measurement

Sign Off !!

ZONE: Warehouse/Storage

Space Definition | Windows & Doors | Lighting System | Schedules

Heating & Cooling | Ventilation | **Refrigeration**

Refrigeration (Walk-In) 1 of 2

Walk-In Refrigeration Data

Walk-in Coolers Area: (ft²)

Walk-in Cooler Walls: (ft²)

Walk-in Coolers Wall R-value:

Walk-in Freezers Area: (ft²)

Walk-in Freezers Walls: (ft²)

Walk-in Freezers Wall R-Value:

Medium Temp Walk-ins and storage

Low Temp Walk-ins and storage

Lights and Fans

	Lights	Fans
Walk-in Cooler:	<input type="text" value="0.87"/> (W / ft ²)	<input type="text" value="1.31"/> (W / ft ²)
Walk-in Freezer:	<input type="text" value="0.92"/> (W / ft ²)	<input type="text" value="1.38"/> (W / ft ²)

Refrigeration (Walk-In) 1 of 2

Figure 31: Define the Warehouse Refrigeration System – Part 2

Refrigeration (Walk-In) 2 of 2

Walk-in Light Controls

Low Temperature:
Off during unoccupied periods ▼

Medium Temperature:
Off during unoccupied periods ▼

Walk-in Defrost Controls

Low Temperature:
Thermostatic finish ▼

Medium Temperature:
On timer ▼

MUST be specified for
CBIP Compliance

Equipment

	Low Temperature	Medium Temperature
Compressor EER: (Btu / h - W)	4.50	8.50
Defrost Type:	Electric ▼	Electric ▼
Heat Recovery Type:	80% condensing ▼	80% condensing ▼
<input checked="" type="checkbox"/> Walk-in Floating head pressure.		
<input type="checkbox"/> Walk-in Mechanical subcooling		
Total heat recovery coil capacity:	85000.00 (Btu / h)	

Refrigeration (Walk-In) 2 of 2

This value has priority
and overrides the Heat
Recovery Type

Figure 32: Define the Retail zone Dehumidification System

PROJECT : Example

CBIP Help

<< Back To Main Diagram

ZONE: Food Retail with Display Cases

Space Definition	Windows & Doors	Lighting System	Schedules
Heating & Cooling	Ventilation	Dehumidification	Refrigeration

Space has dehumidification

Must be checked to enable dehumidification

System Definition

Control Set Point: %

Type: ▾

Save

Save & Continue >>

<< Save & Go Back

Figure 33: Define the Retail zone Refrigeration System – Part 1

IMPORTANT: Insure proper temperature level is selected and display case classes

Refrigeration (Display Cases) 1 of 3

Display Cases Data	Length
Class 1- low-temp multideck:	<input type="text" value="0.00"/> (ft)
Class 2- medium-temp multideck (dairy):	<input type="text" value="191.60"/> (ft)
Class 3- medium-temp multideck (meat):	<input type="text" value="97.50"/> (ft)
Class 4a- low-temp closed multideck:	<input type="text" value="141.10"/> (ft)
Class 4b- medium-temp closed multideck:	<input type="text" value="0.00"/> (ft)
Class 5- low-temp well-type (open or closed):	<input type="text" value="140.00"/> (ft)
Class 6- medium-temp single deck:	<input type="text" value="128.50"/> (ft)
Class 7a- high-temp single deck island-type (wide):	<input type="text" value="56.50"/> (ft)
Class 7b- high-temp single deck island-type:	<input type="text" value="0.00"/> (ft)
Class 8a- low-temp service cabinet (fan coil):	<input type="text" value="5.00"/> (ft)
Class 8b- medium-temp service cabinet (fan coil):	<input type="text" value="0.00"/> (ft)
Class 8c- high-temp service cabinet (gravity coil):	<input type="text" value="0.00"/> (ft)

Refrigeration (Display Cases) 1 of 3

Figure 34: Define the Retail zone Refrigeration System – Part 2

Refrigeration (Display Cases) 2 of 3

Reference will have the same

Display Cases Data	Lights (W/ft)	Fans (W/ft)	Anti-sweat (W/ft)
Class 1- low-temp multideck:	20.00	25.00	30.00
Class 2- medium-temp multideck (dairy):	20.00	25.00	0.00
Class 3- medium-temp multideck (meat):	15.00	25.00	20.00
Class 4a- low-temp closed multideck:	30.00	20.00	70.00
Class 4b- medium-temp closed multideck:	0.00	0.00	0.00
Class 5- low-temp well-type (open or closed):	0.00	10.00	20.00
Class 6- medium-temp single deck:	10.00	10.00	0.00
Class 7a- high-temp single deck island-type (wide):	0.00	20.00	0.00
Class 7b- high-temp single deck island-type:	0.00	0.00	0.00
Class 8a- low-temp service cabinet (fan coil):	10.00	20.00	20.00
Class 8b- medium-temp service cabinet (fan coil):	0.00	0.00	0.00
Class 8c- high-temp service cabinet (gravity coil):	0.00	0.00	0.00

These can provide EE credits

Figure 35: Define the Retail zone Refrigeration System – Part 3

Home PROJECT : Example << Back To Main Diagram
Account Management CBIP Help

ZONE: Food Retail with Display Cases

Space Definition	Windows & Doors	Lighting System	Schedules
Heating & Cooling	Ventilation	Dehumidification	Refrigeration

Refrigeration (Display Cases) 3 of 3

Display Case Light Controls

Low
Off during unoccupied periods

Medium
Off during unoccupied periods

High
Off during unoccupied periods

Display Case Defrost Controls

Low
Thermostatic finish

Medium
On timer

High
On timer

Requires hardwired controls

Figure 36: Define the Retail zone Refrigeration System – Part 4

Display Case Equipment			
	Low	Medium	High
Compressor EER: (Btu / h - W)	<input type="text" value="4.50"/>	<input type="text" value="8.50"/>	<input type="text" value="8.50"/>
Defrost Type:	<input type="text" value="Hot Gas"/>	<input type="text" value="Electric"/>	<input type="text" value="None"/>
Heat Recovery Type:			
Low:	<input type="text" value="80% condensing"/>		
Medium:	<input type="text" value="80% condensing"/>		
High:	<input type="text" value="80% condensing"/>		
Anti-Sweat Controls:			
Low	<input type="text" value="50% duty cycle below 30 % RH"/>		
Medium	<input type="text" value="50% duty cycle below 30 % RH"/>		
High	<input type="text" value="50% duty cycle below 30 % RH"/>		
<input checked="" type="checkbox"/> Display Case Floating head pressure.			
<input checked="" type="checkbox"/> Display Case Mechanical subcooling			
Total heat recovery coil capacity:	<input type="text" value="600000.0"/>	(Btu / h)	

Refrigeration (Display Cases) 3 of 3

These will be overridden for CBIP Compliance

Figure 37: Completed Project Definition

Home

Account Management

Start a New Project

My Projects

Change to Metric Unit of Measurement

Sign Off //

PROJECT : Example

The following diagram illustrates each zone of the Retail Food Store that you will need to define for the compliance analysis. Select the "Modify..." button in each zone, and the EE Wizard will lead you through the data entry.

Modify... Project Definition.

Define Building Zones

If a zone is not applicable to your RFS Project, please leave the box unchecked within that zone.

COMPLETE Modify... Warehouse/Storage. (<input checked="" type="checkbox"/> Check if applicable)		Not required in this project
COMPLETE Modify... Food Retail with Display Cases. (<input checked="" type="checkbox"/> Check if applicable)	**incomplete** Modify... Non-Food Retail. (<input type="checkbox"/> Check if applicable)	
COMPLETE Modify... Store Front/Cashiers (<input checked="" type="checkbox"/> Check if applicable)	COMPLETE Modify... Offices (<input checked="" type="checkbox"/> Check if applicable)	

Building Region

Ontario - Region A - Toronto Save

Always use the Save button when changing location

Figure 38: Defining Utility Rates – Part 1

Define Utility Rates
 In order to define the utility rates associated to this project, please place a check mark in the box next to each utility that applies.

<input checked="" type="checkbox"/>	<input type="button" value="Modify..."/>	Electricity - Energy Rates	<i>incomplete</i>
	<input type="button" value="Modify..."/>	Electricity - Demand Rates	<i>incomplete</i>
<input checked="" type="checkbox"/>	<input type="button" value="Modify..."/>	Natural Gas Rates	<i>incomplete</i>
<input type="checkbox"/>	<input type="button" value="Modify..."/>	Propane Rates	<i>n/a</i>
<input type="checkbox"/>	<input type="button" value="Modify..."/>	Fuel Oil Rates	<i>n/a</i>

Only electricity and natural gas required in this project

Figure 39: Defining Utility Rates – Part 2

Home PROJECT : Example << Back To Main Diagram

Account Management

Start a New Project

My Projects

Change to Metric Unit of Measurement

Sign Off !!

DEFINE: Electricity - Energy Rates

Number of Blocks: Charges are per kWh of energy

Energy Rate Type: kWh kWh / kW

Monthly Charges (\$):

Block 1
 Charge (\$/kWh): kWh Limit:

Block 2
 Charge (\$/kWh): kWh Limit: *No Limit*

Always use the Reset button when changing Energy Rate Type or Number of Blocks

0.05 \$/kWh for the first 50000 kWh of each month

Figure 40: Define Utility Rates – Part 3

Home

Account Management

Start a New Project

My Projects

Change to Metric Unit of Measurement

Sign Off !!

PROJECT : Example

<< Back To Main Diagram

DEFINE: Electricity - Demand Rates

Number of Blocks:

Block 1
Charge (\$/kW): kW Limit: *No Limit*

10 \$/kW of monthly peak demand

Figure 41: Defining Utility Rates – Part 4

Home

Account Management

Start a New Project

My Projects

Change to Metric Unit of Measurement

Sign Off !!

PROJECT : Example

[<< Back To Main Diagram](#)

DEFINE: Natural Gas Rates

Number of Tiers: Charges are per Therm of energy

Monthly Charges (\$):

Tier 1
Charge (\$/therm): Therms Limit: 1.09 \$/therm for the first 3.31 therms of each month

Tier 2
Charge (\$/therm): Therms Limit: 1.03 \$/therm for the next 36.36 therms of each month, etc.

Tier 3
Charge (\$/therm): Therms Limit:

Tier 4
Charge (\$/therm): Therms Limit:

Tier 5
Charge (\$/therm): Therms Limit:

Tier 6
Charge (\$/therm): Therms Limit: *No Limit*

Figure 42: EE Wizard Summary Results

Home	PROJECT : Example	
Account Management	Below are the results of the Compliance Analysis system.	
Start a New Project	REFERENCE BUILDING	PROPOSED BUILDING
My Projects	Annual Energy Use	Annual Energy Use
Change to Metric Unit of Measurement	Electricity: 9471.5 MBTU	Electricity: 7568.1 MBTU
Sign Off !!	Propane: 0.0 MBTU	Propane: 0.0 MBTU
	Natural Gas: 2418.6 MBTU	Natural Gas: 795.9 MBTU
	Fuel Oil: 0.0 MBTU	Fuel Oil: 0.0 MBTU
	Annual Reference Building Energy Cost: \$167,991.00	Annual Proposed Building Energy Cost: \$132,770.00
	CBIP Target Energy use: 8917.6 MBTU	Percentage Achieved: 70.3 %
	Click on the link below to download the Compliance Report:	
	Compliance Report (Adobe Acrobat .pdf)	

Incentive = $(167991 - 132770) \times 2$, or max. 60000\$

CBIP Target = 75% or lower

Formal CBIP Compliance Report to send with submission

Figure 43: Defining your Project

Project Name *

Energy Efficiency Measures

EOI Number

Building Location

Address

City

Province

Postal Code

Building Region

Project Designer

First Name

Last Name

Title

Organization Name

Phone

Email

Project Designer Address

Address

City

Province

Postal Code

These fields are **required** for a formal CBIP submission

REQUIREMENTS FOR A CBIP PERFORMANCE PATH SUBMISSION

NRCan Policy Statement

This Policy Statement identifies the base approach for preparing a performance path file & establishes the framework under which variations to the base approach are allowed.

Policy Statement

Background

EE4 Policy

BASE APPROACH

VARIATION 1

VARIATION 2

Work-around information requirements

Confidentiality

Policy Statement

Background

The EE4 software was created to support the CBIP Performance Path, addressing the following:

- To check the compliance of the proposed building design with MNECB and CBIP requirements,
- To assess the energy performance of the proposed building compared to an MNECB reference building.

EE4 incorporates all the necessary features to conduct these tasks.

All the scenarios specified by the Code are handled in EE4, i.e., EE4 completely mirrors the set of MNECB requirements. EE4 incorporates all the CBIP rules that were developed above and beyond the MNECB rules. In summary, if it is in the MNECB or CBIP, then it is coded into EE4.

Conversely, the rules of EE4 are representative of what is required by MNECB & CBIP, i.e., EE4 is there to assist in the checking of MNECB and CBIP rules. In other words, if it is in EE4, that is because it is required by MNECB or CBIP.

However, there are two scenarios where EE4 rules may not accurately reflect specific technologies or systems. For both scenarios NRCan is willing to develop new CBIP rules for these specific technologies or systems.

Scenario 1. Existing technology or system

This is the case when NRCan decides to change the existing set of MNECB & CBIP rules because it agrees that credits should be awarded, or because it wishes to correct a perceived deficiency in the existing set of rules.

When a rule is made for a specific case, in the form of an EE4 work-around or DOE measure, then NRCan should decide whether that rule should be fully developed into an official new CBIP rule (MNECB rules cannot be changed, but can be overruled) or not. In the affirmative, models should be developed, and then incorporated into EE4.

Scenario 2. New technology or system

This is the case when systems or technologies are recently commercialized or used, and were not covered by MNECB or CBIP. It should be noted that this does not refer to systems or technologies that were already addressed in MNECB and for which neither MNECB nor CBIP give any credit. In this latter case, one should refer to the previous scenario.

NRCan should decide whether & how to model these new technologies or systems. If a model is developed, it should be incorporated into EE4.

In all cases, it should be clear that EE4 is meant to serve as the fundamental basis for verifying compliance with MNECB & CBIP requirements, as well as for establishing the energy credit based on the precise set of rules embedded in MNECB and CBIP.

EE4 Policy

The policy is based on a "base approach", with two variations allowed, one for specific technologies and systems, and the other when all other venues have failed. **Any changes to the EE4-generated files, or any DOE files generated without using EE4, will not be accepted without written permission from NRCAN prior to submitting these files to NRCAN.**

BASE APPROACH

EE4 is used exclusively to prepare a performance path submission. To perform an assessment in the context of the whole building performance, NRCAN is establishing the principle that EE4 should be used as a basis.

VARIATION 1

EE4 must be used first, in accordance to the base approach, to create the reference building. Adjustments of the EE4 outputs are allowed and must be all documented. Modifying EE4-generated building files is not acceptable as a standard procedure, however NRCAN recognizes that this may be the most appropriate solution in some particular cases.

The EE4 outputs can be either supplemented with engineering data or edited through changes to the DOE files. Instructions for performing modifications of EE4 outputs for which special CBIP rules have been developed are available from NRCAN. **If the proposed modifications do not have established CBIP rules then the proponent shall notify NRCAN prior to application submission.**

The engineering data used to directly modify the EE4 results can be generated by manual calculations or software outputs such as RETScreen. Changes made to the DOE files generated by EE4 are allowed with the use of a DOE-2 software version authorized by NRCAN.

VARIATION 2

The building take-off is performed directly with DOE including the development of the reference building. **This is acceptable only when it is demonstrated that the other options were exhausted, and requires prior permission from NRCAN to proceed with this approach.**

This approach will require the extensive checking of compliance to MNECB and CBIP requirements for both reference & proposed buildings. As a result, full documentation of the process and assumptions made is required. Files must be submitted in a version of the DOE-2 software authorized by NRCAN.

Work-around information requirements

Software work-arounds are used for energy efficiency measures that cannot be modelled directly in EE4 or DOE-2. When work-arounds are used in a submission, supporting documentation must be incorporated in the file documentation.

For cases for which special CBIP rules have been developed the proponent will follow the documentation requirements set in place by NRCAN.

If the proposed modifications do not have established CBIP rules, then full documentation of the work-around must be submitted.

Confidentiality

NRCAN recognizes that, under special circumstances and for commercial reasons, the applicant may request that some information should remain confidential and that its dissemination be strictly controlled.

It is the responsibility of the applicant to specify which pieces of information should be protected, for instance certain information on drawings or specific software or software modules. Information deemed by the applicant to be confidential information must so be marked.

NRCan will take reasonable measures to treat the confidential information in a confidential manner and unless required by law to do so or unless we have the applicant's written consent, will not divulge it to any third party, except as specified in this Policy Statement.

NRCan will ensure that this information is only shared with parties within NRCan that need to have access to it. In the case the file is reviewed by a qualified member of Assessors Network, NRCan will require that this information be treated in confidentiality through the establishment of non-disclosure agreements or through specific provision otherwise provided for in contracts with this party.

Annex B

Reference Building Rules for the Retail Food Store compliance.

The development of a compliance tool for Retail Food Stores (RFS) requires defining a reference building. Generally, the definition of a reference building for MNECB compliance purposes is dictated by the “Performance Compliance for Buildings – Specifications for Calculation Procedures for Demonstrating Compliance to the Model National Energy Code for Buildings Using Whole Building Performance” [Canadian Commission on Building and Fire Codes (CCBFC), May 1999].

However, some aspects of RFS buildings are not specifically covered by the CCBFC Specifications. For these items, a standard has been established in order to define the reference building. It was established that the missing specifications should be based on the industry’s current practice.

RFS require additional specifications for its refrigeration equipment, dehumidification requirements and its cooking and baking equipment. All other aspects of RFS, such as envelope, lighting levels, fresh air volumes, domestic hot water load, occupant density and mechanical systems will be based upon the CCBFC specifications already in use in EE4.

Reference Building Refrigeration system

The following rules be applied when defining a Reference building refrigeration system:

- The Reference system refrigeration equipment shall be defined in the same zones as that of the proposed building.
- The refrigeration system shall be defined with a maximum of three different evaporating temperatures. The Reference building shall have use the same temperature levels as that of the Proposed building.
- The reference system refrigeration equipment shall impose the same thermal load to its assigned zone as that of the proposed building.
- The reference system shall have a heat recovery system for space air heating of its assigned zone. The heat recovery capacity shall be set at 25% of the nominal condensing capacity. The nominal condensing capacity shall be estimated as the summation of the individual peak design evaporator load of every refrigeration compressor in the assigned zone multiplied by the following factor $(EER+1)/EER$, where EER is the compressor nominal energy efficiency ratio.
- The Reference building compressors nominal EER shall be 4.5 for systems with an evaporating temperature below 0 F and shall be 8.5 for system with an evaporating temperature above 0 F.

- The Reference building shall use the same part load performance factors than that of the Proposed building.
- The Reference building shall set its heat recovery temperature to 90 F.
- The Reference building minimum condensing temperature shall be set at 90 F.
- The Reference building condenser shall be air-cooled.
- The Reference building condensers fan motor power shall be set to 0.105 W per ton of compressor capacity.
- The Reference building defrost mechanism shall be identical to that of the Proposed building.
- The Reference building defrost control system shall be based on timer ended defrost except for low temperature system where it is thermostatic terminated.
- The Reference building anti-sweat heaters shall have the same installed capacity as that of the Proposed building.
- The Reference building anti-sweat heaters shall have no automatic controls.
- The Reference building Refrigerated Display cases shall have internal electric loads based on its type as shown in Table 1.
- The reference building internal electric load shall be in operation 24 hours per day.
- The Reference and Proposed buildings shall have identical sensible heat ratio (SHR) regarding the loads imposed to the zone by the refrigerated display cases. The SHR shall be set at 0.7 for evaporating temperature below 0 F, at 0.65 for evaporating temperature between 0 F and 30 F and 0.6 for evaporating temperature above 30 F.

Reference Building Dehumidification system

CBIP does not normally allow modeling dehumidification for compliance purposes. However, consultation held with the industry showed that dehumidification systems for RFS were an important part of their design and had a strong influence on their energy use. Therefore, dehumidification is incorporated in the RFS compliance tool. The following rules, based on observed design, are proposed:

- The Reference building shall have a dehumidification system if the Purposed building has one.
- The Reference building dehumidification system shall be based on a direct expansion single zone system.
- The capacity of the Reference building dehumidification system shall be based on the CCBFC specifications for sizing cooling equipment with a SHR of 0.65. If the proposed building does not incorporate cooling, the dehumidification system shall be size to meet the assigned zone peak cooling load.

- The humidity set point used for control the dehumidification system shall be set at a maximum 40 % or the value entered in the Proposed building.
- The dehumidification system COP shall be set in accordance to CCBFC specifications concerning reciprocating direct expansion cooling equipment.

Table 1: Reference building internal electric loads for Display Cases

Display Case CSA Type	Fan power (W/ft)	Lighting power (W/ft)
Class 1	25	20
Class2	25	20
Class 3	25	15
Class 4 - low	20	30
Class 4 – medium	20	30
Class 5	10	0
Class 6	10	10
Class 7 – wide	20	0
Class 7 – narrow	20	0
Class 8 – low	20	10
Class 8 – medium	20	10
Class 8 – gravity	0	10

Reference Building Process loads

As for any other CBIP building, it is adopted that any loads considered as process be modeled identically in the Proposed and Reference building. Process loads for RFS exclude the central refrigeration system but include, without being limited to, the following:

- Baking equipment load;
- Cooking and roasting equipment load;
- Stand-alone refrigeration equipment, such as soft drink dispensers.

The Reference building shall have the same installed capacity, schedules and fuel source as that for the proposed building for these items.