Natural Resources Canada

Ressources naturelles Canada

ecoENERGY
an ecoACTION initiative

New Housing Programs'
2012 ENERGY CREDITS
Effective: 1 July 2012

Canada

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INTRODUCTION

Natural Resources Canada's New Housing Initiatives require the use of HOT2000[TM][1] to model the energy consumption of a house. HOT2000 does not model certain energy efficient measures, such as attached garages, base load credits or renewable energy systems. This document provides procedures for how to account for these measures using the Energy Credits tab of HOT2000.

Summary of Technical Changes

Revision Date	Clause	Technical Changes

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[1] HOT2000 is the official energy analysis software used to perform energy efficiency evaluations in NRCan housing programs. HOT2000 is an official mark of Natural Resources Canada.

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1 SCOPE

1.1 Applicable programs
The procedures outlined in this document apply to new housing programs as outlined in Table 1.

Table 1
New Housing Programs' Applicability
Forming Part of 1.1

Program	Applicable Date
2012 R-2000 Standard	July 1, 2012
2005 EnerGuide Rating System (New Homes)	December 1, 2012
2012 ENERGY STAR® for New Homes (ESNH) Standard[2] (performance approach only)	December 1, 2012

NOTES:
1) Homes built under the 2005 EnerGuide Rating System or the pre-2012 ENERGY STAR for New Homes program (i.e., NRCan's *Minimum Requirements for ENERGY STAR Qualified New Homes*, the *Technical Specification – Ontario*, or the *Saskatchewan Builder Option Package (BOP)*) may use the 2012 Energy Credits document prior to December 1, 2012.
2) For the *2012 ESNH Standard*, this document applies only where performance targets have been specified in Section 6 in the *2012 ESNH Standard*.

1.2 Use of alternative credits
Credits not outlined in this document shall not be used unless pre-approved by NRCan.

2 ENERGY CREDITS TAB IN HOT2000

2.1 General
HOT2000 has the capability to add credits to the EnerGuide Rating for measures outlined in this document. The "Energy Credits" tab is only available when in "R-2000" mode or "EnerGuide Rating (new houses)" mode, not in "General" mode. To access the "Energy Credits" select "Base Loads" from the tree view; "Energy Credits" is the second tab, as shown in Figure 1 below.

2.2 Photovoltaics
Although there is a "Photovoltaic solar panels (PV arrays)" field on the Energy Credits screen, it is not active. See Section 4 for details on how to account for electricity generated from photovoltaic systems.

2.3 Wind energy contribution
Where electricity is generated with a wind turbine, the "Wind energy contribution" check box shall be clicked and the value shall be determined by 3.1.

2.4 Electronic baseboard thermostats (used in electric baseboard applications):
Where thermostats meeting the requirements of 3.2 are installed, the check box shall be clicked. The value will be automatically calculated after a simulation is performed.

2.5 Ventilation system credits
Ventilation credits are automatically generated by HOT2000 when dedicated ventilation duct work is present, or when a furnace blower motor is modeled with a high efficiency motor and used to distribute ventilation air. There is no user entry allowed or required for this field.

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[2] The ENERGY STAR® mark is administered and monitored in Canada by Natural Resources Canada. Used with permission. EnerGuide and R-2000 are official marks of Natural Resources Canada.

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2.6   Credits for attached garage

Where a garage is attached to the heated space of a house, the check box shall be clicked, and the value of the credit determined according to 3.3.

2.7   Lighting Credits (3 credits allowable)

The fields in this section have been rendered obsolete and shall not be used. Refer to the procedure outlined in 3.4 for details on how to calculate energy credits from lighting.

2.8   Other Credits (1st line)

The value to be entered in the first "Other Credits (Specify)" section is reserved for base load credits, and shall be determined in accordance with 3.4.

2.9   Other Credits (2nd line)

The value to be entered in the second "Other Credits (Specify)" section is reserved for drain water heat recovery units, and shall be determined in accordance with 3.5.

IMPORTANT:

Once the appropriate credits are entered, it is imperative to recalculate the energy consumption. To do this, go to the main menu and select "Reports" then "Calculate" (or Alt+C). This instructs HOT2000 to automatically perform the calculation and populate the energy credit fields.

Figure 1 : Screen Capture of HOT2000 Energy Credits Tab

NOTE: Screen shots in this document reference HOT2000 version 10.51 throughout. However, this document is also relevant for regions in which NRCan has approved the continued use of HOT2000 version 9.34c.

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3 APPLICABLE ENERGY CREDITS

3.1 Wind Energy

The energy contribution from wind power generation shall be calculated using RETScreen Software. Once the kWh value has been calculated in RETScreen, it can then be entered into the HOT2000 "Energy Credits" screen as shown in 2.3.

NOTE: To download the RETScreen software, or obtain more information, visit
<http://www.retscreen.net/ang/home.php>.

3.2 Electronic Thermostats used in Electric Baseboard Heating Applications

Electronic wall-mounted thermostats conforming to CAN/CSA C828-06 (R2011) "Performance Requirements for Thermostats Used with Individual Room Electric Space Heating Devices" are eligible for energy credits. The energy credit is 1% of the Estimated Annual Space Heating energy consumption for the house. HOT2000 will automatically perform this calculation and populate the "Energy credit for electronic thermostats (used in electric baseboard applications)" field when selected, as shown in 2.4.

NOTE: Thermostats do not have to be programmable, but they must be electronic.

3.3 Attached Garages

The buffering effects of an attached garage can be estimated by adjusting the thermal resistance (RSI/R value) of the envelope elements between the heated space and the garage (common surfaces with the evaluated house). Typically, these are the shared walls between the house and the garage, the common door to the garage, a shared floor header, and basement wall. Garage exterior walls are not considered main walls. If there is a heated room above the garage, the floor of that room is treated as an exposed floor.

Use the following steps to calculate the energy credit for attached garages:

1. When performing take-offs for input into HOT2000, keep the common main wall, floor header perimeters and exposed floor area over the garage as separate items. The common foundation wall area should be recorded separately using the composite selection.

2. Establish the RSI/R values for the common envelope components, enter all information as usual in the HOT2000 file, and complete the modeling of the file. When the file is completely modeled, make sure that you save the HSE file.

3. Run HOT2000 so that the effective RSI/R values of the building components are calculated. Note the total energy consumption. For common basement walls make sure that the effective R/RSI value is modeled in the composite section and not the nominal one.

   NOTE: These steps are necessary to maintain original envelope codes and not have them overwritten by the 'user specified' values. This is to facilitate quality assurance.

4. Determine the percentage of attachment of the garage to the house as follows:

   Percentage of attachment = (area of common surfaces of the house attached to the garage) ÷ (the total surface area of the garage)

   Common surfaces of the house attached to the garage include areas of walls, exposed floor above garage, doors, floor headers and other features that are shared by the house and garage.

The total surface area of the garage includes the common surface area to the house being evaluated as well as any other adjacent building plus the area of the garage components exposed to the exterior elements (walls, windows, exterior doors including the garage door, and to other buildings) and the floor and ceiling areas.

5. Determine if the exterior garage components are insulated or uninsulated and finished or unfinished to determine which adjustment factor from Table 2 will be used to adjust the RSI/R value of the attached components.

> *For example, a garage with uninsulated and finished exterior components with an attachment of 30% has a buffering effect of 10% represented by an adjustment factor of 1.10. If the exterior garage components are uninsulated and unfinished (no drywall on the ceiling or exterior walls), the buffering effect is reduced by half as shown in Table 2, thus the RSI/R adjustment factor is 1.05.*

The RSI/R Adjustment factor should NOT be interpolated. When the calculated percentage is not shown on the table, choose the RSI/R Adjustment Factor for the lower Percentage value.

> *For example, if the calculated Percentage of Attachment for uninsulated, finished exterior garage components is 40% the RSI/R adjustment factor will be the one for 30% of 1.10.*

Table 2
RSI/R Adjustment Factors for Finished and Unfinished Attached Garages
Forming Part of 3.3

Percentage of Attachment	RSI/R Adjustment Factor		
	Uninsulated		Insulated
	Finished	Unfinished	Finished
15%	1.05	1.03	1.08
30%	1.10	1.05	1.16
45%	1.16	1.08	1.24
60%	1.21	1.10	1.32
75%	1.26	1.13	1.40

6. Manually calculate the RSI/R value to use for each of the common elements between the garage and the house as follows:

Adjusted RSI/R Value = (effective value of the element) x (adjustment factor)

7. Change the assembly components of the common elements in HOT2000 to "User specified" and enter the adjusted RSI/R value. Save the file under another file name for your records.

8. Perform the HOT2000 calculation as usual and note the adjusted total energy consumption.

9. Determine the attached garage credit using the total energy consumption that you noted in step 3 above, minus the adjusted total energy consumption that you noted in step 8 above.

10. In the original house file (HSE) from step 2 above, under the "Base Loads" section, in the Energy Credits tab, select "Credits for attached garage" and enter the amount that you calculated in step 9. Make sure that the appropriate units are used when the credits are entered in the file (see Section 2.6).

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3.4   Base Load Credits

3.4.1   Eligibility

3.4.1.1   Lighting

Where fixtures are ENERGY STAR qualified or are equipped with ENERGY STAR qualified bulbs for the specified area, credits shall be applied from one of (a), (b), or (c). To be eligible for a credit, all of the lighting for which a credit is claimed must be installed at the time of the as-built evaluation.

(a) Credit is given on a per room basis, where <u>all</u> fixtures or bulbs are ENERGY STAR qualified for the room specified, per Table 33.

Table 3
Lighting Energy Credits
Forming Part of 3.4.1.1(a)

Room Name	Credits (kWh/year)
Kitchen	70
Dining Room	70
Main hallway and bathroom	50
Living Room	40
Family Room	60
Bedrooms[1]	15
Basement	5

NOTE: All bedrooms in the house must comply in order to qualify.

(b) Where 75% of the entire house, including decorative, stair, and exterior lighting, is lit using ENERGY STAR qualified fixtures or ENERGY STAR qualified bulbs, 295 kWh/year may be claimed. When choosing this option, the 75% shall be calculated as follows to determine the minimum total number of fixtures:
   1) Take the total number of fixtures,
   2) Multiply the total by 0.75, and
   3) Round to the nearest whole number.

> *For example, if a home has 19 or 20 fixtures, at least 15 shall be ENERGY STAR qualified fixtures or contain ENERGY STAR qualified bulbs.*

(c) Where the entire house, including decorative, stair, and exterior lighting, is lit using ENERGY STAR qualified fixtures or ENERGY STAR qualified bulbs, 420 kWh/year may be claimed.

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3.4.1.2   ENERGY STAR Qualified Appliances

Where new ENERGY STAR qualified appliances are installed in the house, credits may be applied in accordance with Table 4.

Table 4
Credits for ENERGY STAR Qualified Appliances
Forming Part of 3.4.1.2

Room Name	Credits (kWh/year)
ENERGY STAR qualified refrigerator	50
ENERGY STAR qualified freezer	40
ENERGY STAR qualified dishwasher	20
ENERGY STAR qualified clothes washer	25

NOTE: Only one of each type of each appliance will be considered for the energy credit calculation.

3.4.2   Data Entry
Credits for reducing base loads (i.e., lighting and appliances) shall be entered in the <u>first</u> line of "Other Credits (Specify)" section of the "Energy Credits" tab as shown in 2.8.

The steps for calculating the value of these credits is as follows:
1) Add up the total amount of base load credits from 3.4.1.1 and 3.4.1.2.
2) Select the check box in the <u>first</u> line under "Other Credits (Specify)". In the comment field, enter 'base load energy credits', then specify in kWh the credit calculated in step 1. This will provide a credit that will be automatically calculated in the EnerGuide rating.

3.5   Drain Water Heat Recovery

3.5.1   Eligibility
A drain water heat recovery (DWHR) unit that can be accounted for using energy credits must:
1) be installed not exceeding 5 degrees from vertical plumbing stack,
2) be listed in Table 5, and
3) service:
   a. two or more showers (or one shower if only one shower is present in the house) to obtain a full energy credit, or
   b. only one shower, when more than one shower is present in the house, to obtain half credit.

3.5.2   Data Entry
Credits for DWHR units shall be entered in the <u>second</u> line of "Other Credits (Specify)" section of the "Energy Credits" tab as shown in 2.9.

To model the DWHR and credits within HOT2000, complete the following steps:
1) Select the appropriate credit from Table 5.
2) Select the check box in the second line under "Other Credits (Specify)", as noted in 2.9, add a description of the DWHR unit (i.e. DWHR unit model xxx), and specify in kWh the credit determined from Step 1.

Table 5
List of Eligible Drain Water Heat Recovery Systems, as of June 2010
Forming Part of 3.5.2

Drain Water Heat Recovery System Make and Model	Full Credit (kWh)	Half Credit (kWh)
EcoInnovation Technologies (ECO-GFX)		
• S3-40 (75 mm/ 3 inch drain at 39% steady state)	1418	709
• S4-40 (102 mm/ 4 inch drain at 44.7% steady state)	1625	813
• G3-40 (75 mm/ 3 inch drain at 46% steady state)	1673	837
• S3-60 (75 mm/ 3 inch drain at 49% steady state)	1782	891
• S4-60 (102 mm/ 4 inch drain at 51% steady state)	1854	927
Watercycles Energy Recovery Inc. (Watercycles)		
• DX-4048 (102 mm / 4 inch drain at 44% steady state)	1603	802
• DX-3058 (75 mm / 3 inch drain at 42% steady state)	1529	765
Renewability Energy Inc. (PowerPipe)		
• R3-30 (75 mm/ 3 inch drain at 32.9% steady state)	1194	597
• R3-36 (75 mm / 3 inch drain at 37.9% steady state)	1378	689
• R3-42 (75 mm / 3 inch drain at 42.4% steady state)	1544	772
• R3-48 (75 mm / 3 inch drain at 47.3% steady state)	1725	863
• R3-54 (75 mm / 3 inch drain at 49.2% steady state)	1795	898
• R3-60 (75 mm / 3 inch drain at 53.7% steady state)	1961	981
• R3-66 (75 mm / 3 inch drain at 55% steady state)	2009	1005
• R3-72 (75 mm / 3 inch drain at 58.8% steady state)	2149	1075
• R3-120 (75 mm / 3 inch drain at 67.7% steady state)	2478	1239
• R4-24 (102 mm / 4 inch drain at 31.5% steady state)	1142	571
• R4-30 (102 mm / 4 inch drain at 40.4% steady state)	1470	735
• R4-36 (102 mm / 4 inch drain at 42.4% steady state)	1544	772
• R4-42 (102 mm / 4 inch drain at 46.1% steady state)	1681	840
• R4-48 (102 mm / 4 inch drain at 52.7% steady state)	1924	962
• R4-54 (102 mm / 4 inch drain at 54.7% steady state)	1998	999
• R4-60 (102 mm / 4 inch drain at 58.4% steady state)	2135	1067
• R4-66 (102 mm / 4 inch drain at 59.9% steady state)	2190	1095
• R4-72 (102 mm / 4 inch drain at 62.9% steady state)	2301	1150
• R4-120 (102 mm / 4 inch drain at 72.2% steady state)	2644	1322

NOTE: This list may change over time. For an updated list, please contact your service organization or see the list of approved systems at: http://oee.nrcan.gc.ca/residential/personal/retrofit-homes/drain.cfm

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4   PHOTOVOLTAIC SYSTEMS

This section is included because the energy generated from a photovoltaic system is added much like an energy credit to the overall EnerGuide rating.

Where a photovoltaic system is present, it must be modeled under "Generation" from the main tree branch.
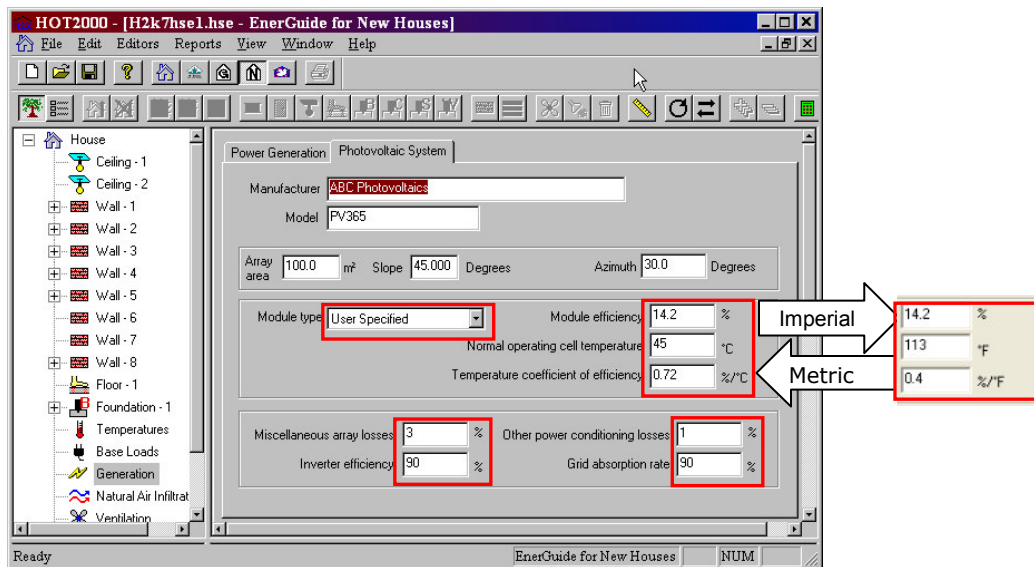
To model photovoltaic systems:
1. Under "Generation", add a check mark in the "Photovoltaic System" box.
2. Select the "Photovoltaic System" tab.
3. Complete all of the fields. "Manufacturer", "Model" (number), "Array area", "Slope" and "Azimuth" are the minimum required fields.

For HOT2000 version 10.51:
• Keep the default values outlined in red below if not all of the values are known.

For HOT2000 version 9.34c:
• Select "User Specified" for the "Module Type". Enter information listed under #3 above.
• Manually enter default values in the fields indicated below, unless these values are known (see figure below).

Figure 2: Default values to be entered when modeling Energy Credits for photovoltaic systems using HOT2000 version 9.34c

NOTE: If deselecting the "Photovoltaic System" checkbox on the "Generation" page, it is imperative to set the "Array area" to zero before un-checking the box.