

GreenHome

DESIGN OBJECTIVES

1. PURPOSE

- 1.1 The Yukon Housing Corporation (YHC) GreenHome Program Design Objectives**
This document presents goals and commentaries to assist the homeowner in meeting the *GreenHome* energy targets and understanding general energy efficiency building principles.

Commentary

The goals of the GreenHome Program are to improve the energy efficiency of new and existing homes. The Design Objectives are intended to give the builder and homeowner a basic understanding of design considerations, building components and systems.

- 1.2 Other Energy Programs and Documents** - The following programs and documents provide additional information on procedures and objectives beyond the scope of this document and the *GreenHome* program.
- *R-2000 Home Program*
 - *CHBA EnviroHome Program*

2. SCOPE

- 2.1 Single Family detached houses** - These Objectives apply to single family detached houses and row housing covered by Part 9 of the *National Building Code of Canada* that do not share heated areas, ventilation systems, or heating systems with other dwelling units.

Multi-Residential buildings - The design requirements and testing procedures for Low-rise and Multi-Residential buildings are outlined in document 12 -“Multi-Residential Energy/Ventilation Requirements”.

Commentary

Although these objectives are focused on single detached dwellings, the principles apply to all “Green” construction. The program is based on the house meeting the measured energy consumption performance regardless of where the energy comes from. Concerns for alternate heating and power are secondary issues.

- 2.2 GreenHomes Off Electrical Grid** – *Off-grid homes must be designed, evaluated and commissioned to satisfy the Green Home requirements. The GreenHome Program is*

based on the house meeting the measured energy performance regardless of where the energy comes from.

- 2.3 Equivalency** - Yukon Housing Corporation in consultation with NRCan and HRAI has the sole authority to accept equivalent energy materials, products, techniques, or qualifications.

Commentary

This clause provides the mechanism by which new products, systems or concepts may be accepted by the GreenHome Program. It also allows for consultation on differences of opinion as to whether a given feature meets the intent of the requirements.

3. BUILDING ENVELOPE OBJECTIVES

- 3.1 Minimum Insulation Levels** - There are no minimum envelope insulation levels, provided the house meets the calculated energy target of 80 on *the EnerGuide for Homes* scale (or the energy target for R-2000 homes).

Commentary

Because the Design Objectives are a performance-based standard intended to allow the designer flexibility in how to meet the energy target, there are no minimum insulation requirements.

- 3.2 Airtightness – For New Homes:** The building envelope shall be constructed sufficiently airtight such that the air leakage will not jeopardise the building integrity or energy performance level. The minimum acceptable leakage and test results are detailed in the Energy Advisors test report.

Commentary

Airtightness is critical to building performance, not only to save energy but also to ensure durability by preventing moist interior air leaking outward and condensing within the wall cavities. Every GreenHome must have the airtightness of its building envelope tested to assess the level of air leakage. Homeowners of existing housing considering renovations to meet the GreenHome standard should be aware of the possibility of not being able to meet the GreenHome standard due to excessive air leakage.

4. HEATING SYSTEMS

4.1 Heating Design

4.1.1 Sizing of Heating Systems – Design heat loss calculations are recommended to ensure proper sizing of the heating system. A properly sized heating system will have an adequate capacity to meet the heat loss of the envelope and will not be oversized which causes poor operational efficiency.

4.1.2 Design of Forced Air Distribution Systems – For New Homes: Forced air distribution systems are to be designed in accordance with good engineering practice. YHC recommends to have the proposed system design approved by an HRAI-certified Residential Air System Design technician (or

equivalent) or a Licensed R-2000 Mechanical Technician. For Renovated Homes: An existing forced air distribution system cannot always be retrofitted to meet the above standard(s), therefore every reasonable attempt should be made to ensure the existing or retrofitted system is correctly sized, balanced and commissioned.

Commentary

This objective is added to improve system design and increase occupant comfort and satisfaction.

4.1.3 Design of Hydronic Heating Systems – Hydronic heating is to be designed in accordance with good engineering practice. Homeowners or heating contractors are to ensure that field layout and installation meet the manufacturers' design requirements.

- 4.2 Fuel-Fired Space and Water Heating Appliances** – Any fuel fired (oil or gas) or solid fuel (wood, coal) heating appliance that is not rated for use in a depressurised environment will be limited to a maximum of 5 Pascal of depressurisation if installed within the building envelope. The installation of non-rated heating appliance(s) within the building envelope will likely require the use of a make-up air system if balanced ventilation is not installed. A make-up air system will reduce the chance of a dangerous depressurisation condition that causes exhaust spillage into the dwelling. The requirements and testing procedures for the depressurisation test are laid out in the Ventilation Advisors test report. Propane fireplaces are permitted without operable doors and without standing pilot lights.

Commentary

Exhaust spillage can pose a serious health and safety risk to the occupants. Natural draft appliance venting is spillage susceptible. If installed in a building envelope where depressurisation limits are exceeded, then make-up air will be required. Standing pilot lights are not permitted as they would increase the total energy consumption of a GreenHome by at least 6 percent, and possibly up to 23 percent, with no useful contribution to the space heating load.

- 4.3 Non-vented Combustion Appliances** – Non-vented combustion appliances are not allowed in a *GreenHome*. Gas ranges and ovens are permitted provided they are not equipped with pilot lights. Gas ranges and ovens require outside vented range hoods.

Commentary

This clause addresses the health, safety and indoor air quality concerns created by the operation of unvented combustion appliances .

5. Ventilation Systems

- 5.1 Ventilation Design** – the intent is to meet the dwelling ventilation minimum's of *CAN/CSA-F326 Residential Mechanical Ventilation Systems*. The home owner may choose a mechanical installer of their choice, however, it is recommended that the system is to be designed by an HRAI-certified Ventilation Designer or Ventilation Installer or a licensed Mechanical R-2000 technician .

Commentary

A properly designed and installed mechanical ventilation system is essential to achieve good indoor air quality.

- 5.2 Ventilation Equipment** – It is recommended that only certified Heat Recovery Ventilators (HRV's), exhaust fans and kitchen range hoods as listed by the Home Ventilating Institute (HVI) be considered for use. HRV's not listed with HVI should meet minimum efficiency requirements as tested by a third party.

Commentary

A copy of the HVI Certified Home Ventilating Products Directory can be obtained from the YHC office or from HVI at www.hvi.org/directory.

- 5.3 Verification of Ventilation Systems** – Once installed, ventilation systems are to be verified (tested) by an approved *Ventilation Advisor* for system operation. Ventilation and depressurisation requirements and test results are listed in the Ventilation Advisors test reports.

Commentary

This requirement ensures a measured level of indoor air quality and energy savings.

- 5.4 Carbon Monoxide Detectors** - Carbon monoxide detector conforming to *CAN/CSA-6.19-M Residential Carbon Monoxide Detectors* are recommended in houses containing either spillage susceptible combustion appliances or attached garages.

Commentary

This objective addresses concerns about combustion spillage. Besides woodstoves and other solid- fuel burning appliances, attached garages are a concern as hazardous levels of carbon monoxide and other stored products that may off-gas may migrate into the house even if the garage door is open to the exterior

6. Solid-Fuel Burning Appliances

- 6.1 Solid-fuel Appliance Use** – Solid-fuel burning appliances including fireplaces, wood stoves and pellet stoves are permitted in GreenHomes. Only certified appliances meeting either CSA B-415 (*Performance Testing of Stoves, Inserts and Low to Medium Burn Rate Factory Built Fireplaces*), or the US EPA wood burning appliance standards (1990), *40 CFR Part 60* should be considered.

Commentary

The use of spillage susceptible solid-fuel burning appliances is not recommended in Green Homes. This objective addresses concerns about the use of woodstoves, pellet stoves and other solid-fuel burning devices and their associated flues in tightly sealed dwellings. A copy of Yukon Housing Corporations "Burning Smart" procedures and precautions is available to the public in the event that they install such appliances during or after the construction of the home. As an alternative, if a backup heating

system or the aesthetics of a fireplace setting are wanted, consider a sealed gas-fired, fireplace.

7. INDOOR AIR QUALITY

- 7.1 Indoor Air Quality Considerations** – There are no compliance issues dealing with indoor air quality outside of Section 4, Ventilation Systems. The selection of Green building materials is highly recommended in the GreenHome program.

Commentary

Improved indoor air quality is an important feature that a GreenHome owner should consider. While adequate ventilation is part of an effective control strategy, the most effective way to improve indoor air quality is to reduce or eliminate sources of pollutants. Proper materials selection is a key area where builders can make a difference to the air quality in the home. Clients should review the options available so as to improve the indoor air quality of their home.

Definitions

GreenHome - means a home meeting the requirements of the *GreenHome* Program and certified as a *GreenHome*.

EnerGuide For Houses/GreenHome Energy Advisor - means an individual trained and certified by Natural Resources Canada (NRCan) and recognised by YHC to perform GreenHome energy and ventilation evaluations.

Licensed HRAI Technician - means a technician who has been trained and certified by the Heating, Refrigeration, and Air-Conditioning Institute (HRAI) for the design, installation, and commissioning of ventilation and forced air heating systems.

Spillage Susceptible Heating Appliance – Means a vented heating appliance capable of leaking combustion gases out of the appliance or vent system into the building envelope. Unless tested and approved (as indication by an approval plate or attached documentation), the operation of the unit is potentially unsafe if used in a depressurised environment beyond 5 Pascals.

Pressure rated Heating Appliances – means fuel fired heating appliances tested and approved as indication by an approval plate or attached documentation for use in a depressurised environment.