

**SUMMARIES OF
ENERGY EFFICIENT HOUSING PROGRAMS
IN CANADA**

Canadian Home Builders' Association

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INTRODUCTION

The number of energy efficient housing programs available or under consideration in Canada is growing. Many of them provide certificates or labels. The growth in the number of programs, their features and requirements for participation, and the conditions for and implications of program certificates or labels are causing confusion among some builders. This report provides a summary of energy efficiency housing programs and related initiatives that contain an energy efficiency component that are currently available or under consideration.

SCOPE

A core criterion for determining the scope of housing programs and related housing initiatives included in this report is an energy efficiency component. Another major (although not exclusive) criterion is programs/initiatives that provide a label or certificate of some kind based on energy performance. A third major criterion for determining the scope of inclusions is to focus on Canadian programs and initiatives. However, this criterion is not applied rigidly for at least two reasons. One is that some energy efficient housing programs/initiatives apply in other countries as well as Canada. Another is that some foreign program names/labels are noted in Canadian literature or seminars, and they have been included just to clarify what they mean (and that they are not Canadian). Using these criteria, twenty-two initiatives have been identified.

ORGANIZATION OF THE REPORT

The programs/initiatives included in this report are diverse. Some focus heavily on energy efficiency and some include it to a moderate or minor extent. Some certificates or labels may indicate a level of performance of a segment of housing in the market and some may be a label or award for a particular showcase home. Some may pertain to the whole house and some may pertain to housing components. Some programs/initiatives have been available for a long time and are well established, and some are new.

Another dimension that can be used to distinguish housing energy efficiency programs/initiatives is their relevance to builders, i.e., some are relevant to builders of housing under Part 9 of the National Building Code, some are relevant to builders who build medium and high-rise housing, and some are relevant to housing researchers in the field of energy conservation, sustainable development and/or environmental assessment.

These criteria have been applied to group the programs/initiatives into two categories, listed below.

Category 1: Major Canadian Energy Efficient Housing Certificate or Labelling Programs

- R2000.
- EnviroHome
- Super E
- Novoclimat
- EnerGuide for Houses (EGH)

- EnerGuide for New Houses (EGNH)
- Built Green™ Alberta
- LEED
- Energy Star
- Power Smart in BC
- Power Smart in Manitoba.

Summaries of the programs/initiatives listed above are presented in Part 1 of this Report. The order of the summaries is intentional. In some cases, programs utilize features of other programs. For example, EnviroHome, Super E and Novoclimat are based largely on R-2000 or principles of R-2000. A summary of R-2000 is therefore presented before the summaries of EnviroHome, Super E and Novoclimat. This allows some references to be made to R-2000 in the summaries of the other two programs to facilitate readers' understanding of the programs without having to repeat some parts. Similarly, EGH and EGNH are similar and are grouped together. Built Green™ Alberta utilizes the EGNH Program and a summary of Built Green™ Alberta is therefore presented after a summary of the EGNH Program. Similarly, Power Smart Programs in BC and Manitoba are grouped together.

Category 2: Other Energy Efficient Housing Programs/Initiatives

This category contains summaries of a group of diverse programs/initiatives. Some of the programs/initiatives referred to involve energy efficiency as part of a broad range of issues. Some are housing energy award programs that encourage energy conservation through recognizing energy efficient houses and/or their builders. Some of the programs/initiatives in this category are not Canadian but have been included because they are mentioned from time to time in Canada.

- Building Canada Program.
- Green Globes.
- Environmental Choice Program.
- Health Housing Concept.
- Healthy Housing Recognition Program.
- Canada's Energy Efficiency Awards.
- Award for Outstanding Energy Efficiency
- Green Building Challenge and Green Building Assessment Tool (GBTTool)
- Green Building Standard
- Green Building Initiative
- "Net Zero Energy Home" Proposal

Summaries of programs/initiatives listed above are presented in Part 2 of this report.

Formats of Summaries in Category 1

The amount of information in the summaries in Category 1 is more extensive than in the other categories and contained in a consistent framework. The categories in the framework are based on the expected interests of the main intended readership of the summaries: new home builders primarily and also residential renovators. Their main interests are expected to be an understanding of 1) the program provisions, i.e., what does the program certificate or label provide to the builder and his/her customers, and 2) what new home builders and residential renovators must do or be to obtain the certificate or label. These interests suggest a number of topical categories, as follows:

- **Program objectives:** This explains the purpose or intent of the program.
- **Status:** This term refers to when the program was developed and its stage of development or establishment.
- **Scope:** This refers primarily to the types of buildings to which the program applies.
- **Program sponsorship and support:** This refers to who owns, backs and/or delivers the program.
- **“House as a system” approach:** As is increasingly understood, a house functions as a collection of inter-related components, such that changes to one component and/or function affect other components and/or functions. A high quality, high performing, safe and durable dwelling requires that its design and construction be based on a systems approach. A key example is indoor air quality and its relationship to energy efficient construction and its dependence on controlled ventilation and material selection. Therefore, a program’s underpinning by a “house as a system” approach should be of interest to builders and has therefore been reported in the summaries
- **Technical requirements and features:** In the case of energy efficient housing programs, technical requirements related to energy use are clearly important. In addition, related issues, such as resource efficiency and environmental impact are also important. One feature of some programs reviewed is that they set absolute standards and accordingly houses pass or fail that standard. These can be referred to as “pass/fail” programs, e.g., R-2000. Other programs, such as EGH, provide a rating, and these can be characterized as a “scaled” program. These attributes help describe programs and have therefore been included.
- **Quality assurance measures:** This refers to measures to help ensure that the end product performs as intended, or in other words, to measures to help ensure an intended level of quality/performance. Quality assurance measures are not absolute but vary in their degree of stringency. They are affected by the following factors:
 - Examinations by independent third parties.
 - Qualifications of third parties (which can be inferred from their training).
 - Credibility and consistency of procedures followed by third parties in their examinations, e.g., airtightness test procedures and depressurization test procedures.
- **Builder qualifying requirements** refer to conditions to be met by builders to participate in the programs and to obtain the certificates or labels offered. Clearly, they must meet the technical requirements of the programs (noted above). In addition, some programs prescribe eligibility criteria, licensing requirements, marketing requirements, ethical requirements and costs that must be paid.

All of the programs reviewed are voluntary and market-driven, so these attributes are not recorded in the summaries.

Formats of Summaries in Category 2

The summaries in Category 2 contain less information than those in Category 1. In addition, the programs/initiatives are quite diverse. The formats used for summarizing these programs/initiatives reflect their key attributes.

SOURCES AND ACKNOWLEDGEMENTS

The contents of each summary are sourced. Most of the sources are existing documents. In some cases, the information is based on comments by interviewees. In addition and where possible, those responsible for the programs or initiatives have been requested to review the summaries and most have provided comments. Comments from reviewers have been valuable and have been used to make final revisions to the summaries. A list of sources, interviewees and reviewers is presented in Appendix 1.

**PART 1: SUMMARIES OF MAJOR CANADIAN ENERGY EFFICIENT HOUSING
CERTIFICATE OR LABELLING PROGRAMS**

SUMMARY OF R-2000

PROGRAM FEATURES	DETAILS
Objective	To encourage the building of energy-efficient houses that are environmentally friendly and healthy to live in, at a standard of energy efficiency that exceeds that of conventionally built homes.
Status	In 1980, the federal government, through Energy Mines and Resources (now Natural Resources Canada or NRCan) introduced the Super Energy Efficient Home Program (SEEH) to stimulate the rate of construction of more energy-efficient houses. This program became the R-2000 Program which was officially launched in 1982. The R-2000 Standard is owned and backed by Natural Resources Canada (NRCan). R-2000 is currently delivered through regional agents on the basis of agreements with NRCan.
Scope	Two versions of the R-2000 Standard have been developed. One standard, the R-2000 Standard, applies to buildings built under Part 9 of the NBC that do not share heated areas, ventilation systems or heating systems with other dwelling units. The other is the R-2000 Standard for Multiple Unit Buildings applies to dwellings that do share heated areas, ventilation systems or heating systems with other dwelling units.
Program Sponsorship and Support	<p>The R-2000 Standard has been developed and is managed by NRCan in cooperation with the various stakeholders such as the Canadian Home Builders' Association, delivery agents, the Heating, Refrigeration and Air Conditioning Institute (HRAI), the Canadian Manufactured Housing Institute (CMHI) and other provincial government organizations. The Standard is comprised of, and supported by, a number of government-backed components, as follows:</p> <ul style="list-style-type: none"> - A series of tools: Those that support builders include a computer-based energy analysis tool, HOT2000, a number of quality analysis measures and training modules. - Delivery agents: These include Provincial home builder associations, utilities, and private companies contracted to administer the Program in each province. - Service providers: These include plan evaluators, airtightness testers and inspectors. Service providers are an important source of technical information for builders. NRCan provides technical support to builders through service providers. CHBA also provides technical support. - Ongoing research, such as the Advance Houses initiative, as well as feedback from active participants and the housing industry that contributes to the improvement of the R-2000 standard. - Training: NRCan makes available training materials and requires training for key players in the R-2000 Standard. For example, R-2000 builders can attend R-2000 Builder Workshops and must successfully complete the exam. Plan evaluators can attend R-2000 Builder Workshops, the Plan Evaluation Workshop and the HRAI "Residential Mechanical Ventilation Installation" courses. They must successfully complete the examinations in these courses. Airtightness testers must attend the R-2000 Builder Workshop and successfully complete the exam. Inspectors must attend R-2000 Builder Workshop and the R-2000 Inspection Workshop and successfully complete the exams. NRCan also works with the HVAC industry to develop and promote design and installation training courses for HVAC equipment. Training materials are also available for sales agents. Training is generally provided by the delivery agents. - Marketing support: This includes development of national marketing strategies and promotional efforts to builders, consumers and others in the industry. Much of the marketing is done by delivery agents (newspaper, parade of Homes and home shows).
"House as a System" Considerations	<p>R-2000 takes a systems approach to the design and construction of buildings. It views the building as a collection of interrelated systems that determine how the building performs. One manifestation of this approach is various requirements to ensure healthy indoor air that is particularly important because of the airtightness of the building envelope. The following examples illustrate this:</p> <ul style="list-style-type: none"> - R-2000 houses require balanced ventilation systems. - Fuel fired space and water-heating appliances shall have either sealed direct-vent, induced-draft vent or forced venting systems with electronic ignition and shall be independently vented. Induced draft and forced-draft vented appliances shall be capable of positive shutdown in the case of venting system blockages. - Natural gas and propane fireplaces must be either direct vent (sealed) and top or rear vented, or power vented and shall also be capable of positive shut down in the case of venting system blockage. - Ventilation system must comply with CAN/CSA-F326 (which limits indoor/outdoor pressure imbalances) and make-up air is required if oil or solid fuel-fired appliances are installed.

<p>Technical Requirements and Features</p>	<p>R-2000 houses must meet all specified technical requirements (as well as other requirements) to be certified as R-2000 houses. In that sense, it is a pass/fail program (rather than a scaled program). Technical requirements are contained in the R-2000 standard. They include measures for the efficient use of energy, improved indoor air quality (IAQ) and better environmental responsibility in the construction and operation of a house. The standard specifies performance goals and prescriptive measures. The R-2000 standard is periodically updated to ensure that R-2000 houses represent the leading edge of cost-effective housing technology. The scope of the standard is the building envelope and mechanical systems, i.e., ventilation, heating and cooling systems.</p> <p>General requirements: The R-2000 standard is in addition to the building code requirements. The R-2000 standard determines an energy performance target of a house. The target is based on energy consumption for space heating and domestic water heating. The energy target is calculated for each house based on its size, location and fuel type.</p> <p>Building envelope requirements: These requirements focus on reducing energy use but they also affect indoor air quality. Energy use is reduced because envelope systems in R-2000 houses incorporate higher levels of insulation and a degree of airtightness not normally achieved in conventional housing. Indoor air quality is also affected because the tighter envelope also allows a controlled ventilation system (with heat recovery, which also reduces energy use). The specific requirements are as follows:</p> <ul style="list-style-type: none"> - Meet or exceed provincial or local requirements. Insulation levels are not specified but must contribute to meeting the energy target for the house. - Basement wall insulation must cover a substantial portion of the basement wall without reduction to the RSI value. - Building airtightness levels: no greater than 1.5 ACH at 50 Pascals, or a normalized leakage area (NLA) of 0.5 cm²/m² at 10 Pascals. - Windows must meet minimal energy performance levels. <p>Mechanical system requirements: These apply to energy efficiency and indoor air quality.</p> <ul style="list-style-type: none"> - <u>Mechanical system requirements affecting energy use:</u> <ul style="list-style-type: none"> - Heating and cooling appliances must be sized in accordance with Can/CSA F-280, Determining the Required Capacity of Residential Space Heating and Cooling Appliances. - Heating, cooling and distribution systems must be designed in accordance with recognized industry standards and good engineering practice (different standards are cited for different types of systems). - Water heaters (electric, natural gas or propane) must meet specific energy standards. Greywater heat recovery systems may be used. - All wood-burning appliances (fireplaces, wood stoves and pellet stoves; also masonry heaters) must be certified to specified standards (these standards reflect emission and safety concerns). - Ducts carrying outdoor air through a conditioned space must be insulated and have a sealed vapour barrier. - Forced air heating systems that are used to distribute ventilation air shall incorporate a means to reduce electrical loads associated with conventional fan motors/blowers by at least 40% (this requirement has been deferred until April 1, 2005, when it will be implemented throughout the country). - <u>Mechanical system requirements affecting indoor air quality (and therefore also occupant health and safety):</u> <ul style="list-style-type: none"> - Fuel fired space and water-heating appliances shall have either sealed direct-vent, induced-draft vent or forced venting systems with electronic ignition and shall be independently vented. Induced draft and forced-draft vented appliances shall be capable of positive shutdown in the case of venting system blockages. - Natural gas and propane fireplaces must be either direct vent (sealed) and top or rear vented, or power vented and shall also be capable of positive shut down in the case of venting system blockage (this is an occupant health issue). - Ventilation systems must meet CAN/CSA-F326-M91, and be installed by an HRAI certified Residential Mechanical Ventilation Designer or Installer (or an R-2000 recognized equivalent) - Ventilation equipment (HRVs, exhaust fans and kitchen range hoods) must be certified by the Home Ventilating Institute (HVI). - A CO detector meeting specified standards shall be installed in a house containing combustion appliances or attached garages.
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	<ul style="list-style-type: none"> - Oil and solid fuel-fired appliances are the only combustible appliances susceptible to spillage that are allowed in an R-2000 home. - Unvented combustion appliances cannot be installed in R-2000 houses. <p>Other requirements to contribute to good indoor air quality: The prescribed requirements focus on the selection of products that have no or limited emissions of noxious substances. At least three of the indoor air quality feature identified in the current version of the R-2000 Indoor Air Quality and Environmental Features Pick-List shall be used in the house. The current version lists nine items. The first seven must meet specified criteria, i.e., 1) carpeting, 2) air filtration, 3) paints and varnishes, 4) floor adhesives, 5) kitchen cabinets and bathroom vanities and 6) vinyl flooring and 7) particle board underlayment; 8) sub-slab depressurization and 9) specified moisture control strategies.</p> <p>Environmental requirements: The following requirements use resources efficiently and reduce environmental impact.</p> <ul style="list-style-type: none"> - Plumbing fixtures (toilets, showers and faucets) must meet criteria to reduce water use. - Environmental features: At least two of the 13 environmental features in the current version of the R-2000 Pick-List shall be used in the house. All items listed must meet specific criteria. In the case of products, i.e., four types of insulation products, two types of sheathing/drywall and three types of interior trim, they must contain high amounts of recycled content. Another environmental option is the selection of energy efficient appliances that meet Energy Star® technical specifications, where applicable or in the upper 33% of the EnerGuide rating for that appliance. Another option is to produce a house that performs at 15% less than the energy target and has cooling systems rated with EER or SEER values that meet or exceed stated performance requirements. <p>Energy credit opportunities: The Program offers optional credits to builders to help them meet the energy target for the home, as outlined below:</p> <ul style="list-style-type: none"> - A specified credit for the use of high-energy efficient lighting in up to three spaces in the house. - An airtightness credit for achieving a tightness of 1.0 ACH (versus 1.5 ACH) under the blower door test protocol. - A ventilation air distribution credit under specified conditions, i.e., use of energy-efficient motors (variable speed motors) in the furnace to distribute ventilation air or for a fully ducted HRV and radiant heating system or electric baseboard heating. - A credit for installing a wall-mounted, line voltage electronic thermostat wall with a temperature swing of 1°C or less to control electric baseboard heating.
Quality Assurance Measures	<p>Quality assurance is achieved through 1) On-site inspection of the house by qualified*, independent third parties on the house's compliance with specific standards, 2) requirements for the people who build, work on and examine R-2000 houses to have specified qualifications and corresponding training requirements and 3) the consistent use of credible procedures and equipment.</p> <p>* R-2000 specifies training and licensing requirements for the following key members of the R-2000 delivery system: delivery agents, file managers, plan evaluators, airtight testers, inspectors, and mechanical ventilation system designers and installers.</p> <p>The following list highlights the main quality assurance measures:</p> <p>Examinations by Service Providers</p> <ul style="list-style-type: none"> - <u>Plan Evaluators</u>: Plan evaluators are key to quality assurance in R-2000. Their duties are to help the builder determine that the R-2000 house complies with the R-2000 technical requirements at the design stage. The plan evaluator models the house using the current version of the HOT2000 software and often considers various options by which the builder can meet the energy target in a cost-effective way. The work of the plan evaluator includes the following reviews: 1) minimum insulation levels, 2) minimum window characteristics, 3) appropriateness of air and vapour barriers, 4) continuity of air barriers, 5) construction details, 6) compliance of ventilation system to CAN/CSA F-326, 7) compliance of space and water heating appliances with specified standards, 8) compliance of wood burning appliances with specified standards, 9) compliance of water-conserving plumbing fixtures with specified standards, and 10) compliance of indoor air quality and environmental features. The plan evaluator may also use the Pre-Approved Evaluation Method (PAM). PAM is a procedure for determining compliance with the R-2000 energy target that eliminates the need to perform a separate HOT2000 analysis for each house. - <u>Inspectors</u>: The purpose of the inspection is to ensure that the house as built conforms to the HOT2000 run and details submitted to the delivery agent. The inspector is responsible for verifying that the heating and ventilating system was designed and that someone has taken responsibility for the design, installation and performance testing.

	<p>- Airtightness testers: The airtightness tester conducts the airtightness test in accordance with the CGSB-149.10-M86 standard method for determining the airtightness method of building envelopes, i.e., the blower door test. The airtightness tester also conducts a fan depressurization test, when it is required. This test is required if the HRV or other TVC ventilation system is out of balance by more than 10% at the TVC airflow rate. The test is intended to confirm that the mechanical ventilation system has been designed, installed and balanced to meet the positive and negative pressure requirements of CSA F326 and the R-2000 Standard. Depressurization testing and the installation of a make-up air system would only be required if a wood-burning or spillage susceptible (oil) appliance is installed. The airtightness tester or mechanical contractor carries out a depressurization test to determine if a make-up air system is required where susceptible equipment is used.</p> <p>Practitioner qualifications: All of the key practitioners must meet R-2000 requirements. This means that builders and service providers must meet all of the requirements to be licensed. In addition, ventilation systems must be installed by an HRAI certified Residential Mechanical Ventilation Designer or Installer or an R-2000-recognized equivalent.</p> <p>Equipment standards: Ventilation equipment (HRVs, exhaust fans and kitchen range hoods) must be certified by the Home Ventilating Institute (HVI).</p>
<p>Builder Qualifying Requirements</p>	<p>Licensing and other qualifying requirements:</p> <ul style="list-style-type: none"> - To be an R-2000 builder, a builder must be licensed. To be a licensed R-2000 builder, a builder must successfully complete an R-2000 Builder Workshop (pass the examination with a minimum mark of 75%, build a certified R-2000 demonstration home within two years of completion of the R-2000 workshop, attend the R-2000 Builder Update every two years and hold a valid R-2000 Builder Licensing Agreement with NRCAN. This entitles him/her to build R-2000 homes and to use the R-2000 logo. - The builder must designate at least one person in the company who is licensed and trained as an R-2000 builder to represent the company. - An active R-2000 builder (one who has completed the qualifying process and is actively engaged in building R-2000 houses) must build and obtain NRCAN certification for at least one R-2000 house every three years. <p>Costs: Fees for builders vary by jurisdiction. For example, enrolment and/or application fees apply in some regions but not others. Builders' service providers' costs, i.e., costs for plan evaluations, first home inspection, final home inspection and blower door tests also vary. Total costs may be in the range of \$800-\$1,000 (these costs do not include verification of the heating or cooling systems). NRCAN provides a contribution of \$300 to delivery agents for each R-2000 certified house.</p> <p>Marketing Requirements: Active R-2000 builders are responsible for promoting R-2000 benefits to their clients, educate clients about R-2000 technology, offer to upgrade clients' plans to R-2000 and encourage them to purchase houses built to the R-2000 standard. The marketing messages used by active R-2000 builders and delivery agents must be consistent with the marketing messages used by NRCAN.</p> <p>Ethical Requirements: All R-2000 licensed persons, companies and organizations must abide by the code and accordingly comply with the R-2000 standard, exercise their duties with honesty, and avoid conflicts of interest.</p>
<p>Summary of Conditions for / Implications of Program Label</p>	<p>A Certified R-2000 home is a home 1) constructed by a licensed R-2000 builder that 2) meets the R-2000 standard as built and as determined by a successful completion of the R-2000 quality assurance process, consisting of plan evaluation, inspection of the building envelope and mechanical systems and airtight testing, and that has been issued a certificate by NRCAN or its authorized designate.</p>

SUMMARY OF ENVIROHOME

Note to reader: The EnviroHome Program is a nation-wide marketing program. From a technical perspective, it is essentially the R2000 Program plus some additional requirements.

PROGRAM FEATURES	DETAILS
Objectives	<ul style="list-style-type: none"> - To recognize and support innovative R-2000 home builders who are committed to offering consumers homes that are “better for you, better for your community and better for the environment.” - To raise homebuyers’ awareness of the full range of comfortable and environmentally friendly features of energy efficient homes.
Status	The EnviroHome initiative was established in 1994 by TD Canada Trust and the Canadian Home Builders’ Association (CHBA).
Scope	This is a marketing initiative to support the R-2000 Program (it applies to the same types of buildings as does the R-2000 Program). It produces showcase homes and is not intended to produce high volumes of housing.
Program Sponsorship and Support	<p>EnviroHome is sponsored by CHBA and TD Canada Trust with support from CMHC and NRCan, through the R-2000 Program.</p> <p>In addition, each EnviroHome must be endorsed by a local home builder association, and carried out by a committee or project team representing the parties involved in project development. The committee must include a representative of the local home builder association (HBA), and a local representative of TD Canada Trust must be invited to participate. It may also include local and regional government officials and local sponsors.</p> <p>EnviroHome projects and their builders are featured on the EnviroHome web site.</p>
“House as a System” Considerations	Same as for R-2000.
Technical Requirements	<p>Each EnviroHome must be an R-2000 registered house.</p> <p>Additional Energy Efficiency Measures The R-2000 Standard gives builders an option of including high energy-efficient lighting fixtures in up to three spaces for specified energy credits to help meet the energy target for the home. EnviroHomes must incorporate at least three high energy-efficient lighting fixtures in the home.</p> <p>Additional Indoor Air Quality Measures The R-2000 Standard requires the incorporation of any three indoor air quality features from an approved list of nine options. EnviroHome houses must incorporate a minimum of six of these options.</p> <p>Additional Environmental Features The R-2000 Standard requires the incorporation of any two environmental features from an approved list of 13 options. EnviroHomes must include a minimum of four of these options.</p> <p>Additional Technical Requirements The additional technical requirements pertain to reducing environmental impact and the efficient use of resources:</p> <ul style="list-style-type: none"> - Building lot/site treatment that demonstrates sound environmental practice, such as reduced water run-off, natural shading and reduced summer watering requirements. - A site waste management plan designed to reduce, reuse or recycle construction –associated wastes. Emphasis is placed on reducing wood waste, corrugated cardboard and drywall wastes. - Use of materials has low levels of embodied energy and that are produced locally. - Incorporation of renewable energy sources, e.g., wind turbines, solar dryers, photovoltaics.
Quality Assurance Measures	Same as for the R-2000 Program.
Builder Qualifying Requirements	<p>Eligibility requirements: A proponent must be an active R-2000 builder and the project must be endorsed by the local home builder association.</p> <p>Costs: The involvement of sponsors usually results in donated products. Builders receive some funding to help cover promotional and reporting-related costs. Signage for the building’s features is also provided to the builder by CHBA.</p>

	<p>Marketing requirements:</p> <ul style="list-style-type: none"> - Each EnviroHome project team must undertake a local promotional campaign that highlights the benefits of environmental housing technology to homebuyers and the community. Signage must include the EnviroHome logo and identify the national EnviroHome partners – CHBA and TD Canada Trust. The builder must also include the R-2000 logo on the signage. Key environmental and energy efficient features should be included on in-home signage. - Upon completion, every EnviroHome is featured in the local news media, and builders offer open-house tours to demonstrate to home buyers – first hand – the wide range of affordable, energy-efficient environmentally friendly and healthy features now available in new houses. - Builders involved in an EnviroHome project should offer the environmental features included in the home as standard or upgrade features in their projects. - EnviroHomes should be priced in a range that is relevant to average buyers. <p>Ethical requirements: R-2000 requirements apply.</p>
Summary of Conditions for and Rights of Program Label	<p>EnviroHome proposals accepted by the National Steering Committee will receive a letter of agreement approving the project based on the proposal. This letter allows the project team to use the EnviroHome trademark as part of their project identification.</p> <p>EnviroHome projects must meet all of the specified technical requirements.</p>

SUMMARY OF SUPER E® HOUSE PROGRAM

Note to reader: The Super E® House Program is for export housing only. It is currently active in three countries: Japan, the UK and Ireland. It is not available to Canadian homeowners. The Super E® House Program is based on the principles of the R-2000 Program.

The Super E® House Program requirements are reviewed continually to reflect changes in Canadian and target country standards and requirements. Readers are welcome to visit the web site for the Program at www.super-e.com for current conditions and requirements.

PROGRAM FEATURES	DETAILS
Objective	<p>The Super E® House Program is intended to improve the volume, profitability and sustainability of Canadian housing systems and building product sales and services in target export markets while providing economical, comfortable energy efficient and environmentally responsible housing to consumers in those target markets.</p> <p>The “E” in Super E® refers to the four main benefits of houses produced under this program: energy efficient, economical, environmentally responsible and enhancing to the homeowner’s quality of life.</p>
Status	<p>NRCan initially developed the Super E® House Program in 1998 to provide comfortable, energy efficient homes for the Japanese market. Since then, over 30 Japanese companies have partnered with 10 Canadian companies to build homes in every region of Japan.</p> <p>In 2001, the Program expanded to the United Kingdom (UK) and matches qualified UK builders with Canadian experts. CMHC supports the Super E® House Program in the UK. The Program has recently been expanded to Ireland.</p>
Scope	<p>The Super E® House Program is for export housing only and is not available to Canadian homeowners. It currently applies to Japan, the UK (i.e., England, Wales, Scotland and Northern Ireland) and Ireland. Demonstration houses may be recognized in other non-target countries but the Super E Office must be notified in advance of construction and units must meet all specified requirements.</p> <p>The Program applies to new low-rise housing, more specifically to detached hoses semi-detached houses, bungalows or row houses that do not share heated areas, ventilating systems or heating systems with other houses.</p>
Program Sponsorship and Support	<p>NRCan developed, delivers, supports and backs the Super E® House Program. CMHC also supports the program in the UK and Ireland. Support to Canadian companies participating in the Program includes training, technical information, market intelligence and marketing materials. More specifically, it includes the following support services and materials:</p> <ul style="list-style-type: none"> - Access to training related to various topics, e.g., doing business in Japan, the UK and Ireland, exporting, financial planning. - Provision of information on cost-effectiveness studies, affordability analysis and other financial advice on request. - Provision of marketing materials, e.g., generic brochures, ad mats and other types of sales information as it pertains to the Super E® product within 48 hours (where the information exists). <p>The Program also provides the following support to both Canadian and foreign companies that participate with Canadian companies in the Program:</p> <ul style="list-style-type: none"> - Access to market research - An annual Super E® conference to access training, networking, marketing and sales information, program direction, etc.
“House As A System” Considerations	<p>As in the case of the R-2000 Program, the technical requirements of the Super E® House Program have been developed on the basis of a systems approach to the design and construction of buildings. This means that buildings are viewed as a collection of inter-related systems and that changes to any component must take account of their impacts on other components or functions. In more consequential terms, it means that the technical requirements of the Super E® Houses have been developed to ensure the conservation of fuel and power in new houses without compromising the health of the occupants, the robustness of construction, or sustainability of the natural environment.</p>

<p>Technical Requirements And Features</p>	<p>Overview: The Super E® House Program Standard or technical requirements provide the basis for the design, construction, testing, inspection and registering of new residential buildings under the Super E House Program. In order for houses to be registered as Super E® Houses, they must meet all of the Super E technical requirements, as well as local building codes and mandatory energy codes. The Super E® House Program is a pass/fail program, not a scaled rating program.</p> <p>Super E® House Program technical requirements are intended to provide improved energy efficiency, comfort, indoor air quality, environmental responsibility, improved moisture control and increased building durability. They are based on the principles of R-2000 and are similar to those of this Program.</p> <p>The technical requirements also give flexibility in design and the selection of construction techniques, building products, mechanical equipment, lighting and appliances.</p> <p>The technical requirements for the Super E® House Program in Japan and in the UK and Ireland are similar but some details are different (the same standards apply in the UK and Ireland). The following notes summarize the main technical requirements in both countries. They can be organized in the following major categories: energy efficiency requirements for the building envelope, mechanical systems (some of which contribute to energy efficiency and some to improved indoor air quality), other indoor air quality requirements, environmental responsibility and moisture control.</p> <p>Energy efficiency requirements:</p> <ul style="list-style-type: none"> - <u>Optional Approaches:</u> Meeting the energy efficiency requirements can be done in two ways: - Prescriptive path: All prescriptive Super E® technical requirements must be met and no simulation is required. - Performance path: In this method, an equivalent reference house that meets the Super E® prescriptive requirements is modeled using HOT 2000™ (HOT2XP™ is also allowed in Japan). The proposed Super E® house is then modeled. The proposed design is deemed acceptable if its projected annual energy usage is equal to or less than the Super E® reference house. <p>Proof of compliance with the Super E® Standard is required at the design stage for each house intended to be a Super E® House.</p> <ul style="list-style-type: none"> - <u>Building Envelope Requirements</u> <ul style="list-style-type: none"> - Insulation values in opaque elements: Minimum thermal resistance values are specified of the building envelope. For the prescriptive approach, the values vary by heating system in the UK and Ireland, and by the climatic zone in Japan. Designers may select opaque building elements with an effective thermal resistance of up to 30% less than otherwise prescribed, as long as the overall energy loss does not exceed the heat loss target of an equivalent reference building. Where radiant cables, pipes or membranes are embedded in the surface of an above-grade component, it shall have a thermal resistance greater than prescribed (20% greater in the UK and Ireland; 25% greater in Japan). - Airtightness: Opaque building envelope elements shall be constructed with a continuous, sealed air barrier which shall separate conditioned space from unconditioned space. Air leakage shall not exceed 1.5 ACH at 50 Pascals when tested in accordance with standard CAN/CGSB-149.10-M86 or 0.7cm²/m² when using the Normalized Leakage Area method (alternate equivalent measures are permitted in Japan). - Windows: Maximum heat transfer (U) values are specified for windows (and roof lights in the UK and Ireland). In Japan, permitted solar heat gain coefficients (SHGCs) are also prescribed. In Japan, the U and SHGC values vary by climatic region. The following additional requirements apply in Japan: insulated spacers are required in cold regions, and windows must meet airtightness requirements. All windows must be certified to CAN/CSA Standard A440-98. In the UK and Ireland, U values vary by type of heating system; also, if the combined area of windows, doors and roof lights exceed 25% of the floor area, the minimum values must be increased so that the total annual heat loss does not increase. In the UK and Ireland, Canadian-supplied windows must also be certified to CAN/CSA Standard A440-98 and meet the same airtightness requirement. - Doors must meet prescribed insulation values (set by zone in Japan). Doors must be weather stripped on all edges to limit the rate of air leakage (standards in Japan and the UK and Ireland are different). - Lighting: Lighting must meet prescribed energy efficiency requirements.
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Mechanical System Requirements: Super E® standards for mechanical systems are designed to increase energy efficiency, ensure comfort, improve indoor air quality, control indoor humidity levels and vent combustion products adequately (for health and safety reasons).

- Mechanical System Requirements Affecting Energy Efficiency

- Equipment sizing: Space heating and cooling equipment must be sized in accordance with CAN/CSA-F280, “Determining the Required Capacity of Residential Space heating and Cooling Appliances” (or acceptable alternate methods in the UK and Ireland), and should not be oversized by more than 10% (or, in the case of cooling equipment in the UK and Ireland, by more than one size increment).
- Equipment efficiency ratings:
 - Central heating systems must meet specified minimum efficiencies. In Japan, more detailed requirements apply that prescribe separate efficiency requirements for various types of heating equipment, e.g., natural gas and propane furnaces, kerosene burners, heat pumps and electric resistance heaters. Requirements apply to central and room-by-room systems and some requirements vary by climatic region. In the UK and Ireland, fans on heating systems must meet minimum energy efficiency requirements.
 - Other heating equipment: In the UK, Canadian-supplied fireplaces, wood stoves and pellet stoves must be certified as meeting either relevant CSA or EPA standards. Masonry heaters shall comply with the requirements specified in the Canadian R-2000 Procedures Manual.
 - Water heating systems: In Japan, gas-fired or propane-fired water heating equipment must meet maximum standby loss requirements. Electric water heaters shall have insulation not less than prescribed minimums or standby losses not exceeding prescribed maximums. In the UK and Ireland, Canadian-supplied water heaters must meet prescribed minimum energy efficiency requirements.
 - Heat recovery ventilators (HRVs) and energy recovery ventilators (ERVs): HRVs and ERVs must meet minimum sensible heat recovery efficiencies (applies only in some climatic regions in Japan).
 - Ductwork in the ventilation system must be air sealed. Ductwork in unconditioned space shall be insulated to a prescribed minimum and covered with a continuous vapour barrier. Ductwork connecting an HRV or ERV to the outside must be insulated and sealed to prevent air leakage and be covered with a well-sealed vapour retarder.

- Mechanical System Requirements Affecting Indoor Air Quality, Comfort and Safety

- All Super E® houses shall incorporate distributed mechanical ventilation systems that have the capability to continuously supply fresh air to or continuously exhaust stale air from every habitable room of the home at rates similar to those prescribed in CAN/CSA-F326).
- All combustion equipment shall have a direct vent (sealed) or induced or forced draft venting systems (in the UK and Ireland, electronic ignition systems are also required). Induced or forced draft venting systems shall be capable of positive shut down in case of venting failure. In the UK and Ireland, gas fireplaces must be installed without openable doors.
- All gas propane and oil-fired water heating equipment shall have direct vent (sealed) or induced or forced draft venting systems. In the UK, induced or forced draft venting systems shall be capable of positive shutdown in case of venting failure.
- Cooling systems: In Japan, houses in warm zones shall have space cooling systems.
- Carbon monoxide detector: In the UK and Ireland, a carbon monoxide detector meeting specified standards must be installed on houses containing either combustion appliances or attached garages.

Other requirements affecting indoor air quality: Super E® houses must incorporate at least three of the low emission materials from a “pick list” contained in the Super E® Standard. In Japan, clients of Super E® houses shall have the opportunity to incorporate all of the low emission materials from a pre-approved list in the Super E® Standard.

Environmental Responsibility: Each house must include at least two items from the list of recycled materials contained in the Super E Standard. In the UK, clients shall have the opportunity to use all of the materials listed on the list. In Japan, clients shall have the opportunity to incorporate into the house other features that reduce the impact of the house including water conserving features, waste management features and the additional recycled materials in the list of recycled materials.

Moisture Control: The Super E® Standard contains many prescriptive measures to control moisture, including the following requirements:

- Building materials must have a moisture content not exceeding 19% at the time of incorporation into the building envelope component, and to protect them from the rain.
- Exterior cladding and sheathing must prevent moisture and rain from causing moisture damage.

	<ul style="list-style-type: none"> - Flashings and trims must be installed at window and door openings, foundation connections, etc. to prevent potential leakage. - Wall systems must have a weather barrier behind the exterior finish for shedding rain and preventing wind washing. - Wall systems must be constructed with a ventilated cavity. - Windows must meet specified water tightness performance. - Control of moisture in crawl spaces (UK and Irish requirements include measures to control soil gases). <p>Japanese requirements also include measures to permit envelope drying for different climates, i.e., heating, mixed or cooling climates.</p> <p>Canadian content: Each house must have a minimum Canadian content of 60%, with the ratio calculated as follows: \$ paid to Canadians/total house material cost.</p>
Quality Assurance Measures	<p>The main steps of a quality assurance program are outlined below:</p> <ul style="list-style-type: none"> - Proof of compliance with the Super E® Standard is required at the design stage for each house. This shall be accomplished through a review of the proposed plans and specifications by an approved third party expert (referred to as a Super E® Design Professional). The assessment includes moisture control measures, mechanical systems, ventilation, indoor air quality and environmental measures. - Adherence to various measures (required or recommended – depending on the export country) to control the quality of windows and their installation, e.g., window installation in accordance with specified practices and by personnel who have taken specified training. - Completion of an air leakage test at the completion of construction conducted by an approved independent third party expert. - The Super E® Standard for the UK and Ireland calls for a final inspection by an inspector designated by the UK builder to ensure that the house has been constructed in accordance with the Standard. Once confirmation is received, the Super E® Office is notified, and following its acceptance, the Super E Office recognized the house as a Super E house. - The Super E House Program may carry out random audits of all participants to confirm that each meets the participant requirements of the Program.
Builder Qualifying Requirements	<p>General Membership Requirements: The Super E® House Program is set up to operate with Canadian company “members” (referred to as Canadian Expert Affiliates) and foreign company “members” who are partners with Canadian members in export countries (currently Japan, the UK and Ireland). In order to become Super E® members, both Canadian and foreign companies must meet specified requirements (which enables them to build Super E® houses). These are outlined below:</p> <p><u>Requirements for Canadian Companies</u></p> <ul style="list-style-type: none"> - Must be Canadian incorporated companies with operations substantially based in Canada. - Must be active in the export of products for a minimum of 5 years. - Must have a Dun & Bradstreet listing. - Must submit an application to become members. If NRCan approves the application, the applicant becomes a “proposed member”. If other Super E® House Program members do not object to the application for membership within a prescribed time period, and if the applicant signs a licensing agreement and submits a cost recovery application fee must, the proposed member becomes a Super E® Designate. - A Super E Designate builds a Super E® House. If the house meets all of the technical requirements, and if the house is registered, the Super E® Designate becomes a full member. - Must attend the Annual Super E Forum (to discuss technical and marketing issues). - Must renew Super E® House Program membership annually. - In the case of Japan, must be able to communicate in Japanese. <p><u>Requirements for Foreign Companies</u></p> <ul style="list-style-type: none"> - Must apply for membership to the Super E® House Program. A foreign company’s application is made through its Canadian partner. - Must have a commitment to building high quality energy efficient housing. Training in Super E® or R-2000 house building techniques is not required but expertise in wood frame housing construction is an asset. - Must sign a licensing agreement and pay an application fee. Once the application has been approved, the applicant becomes a Super E Designate. - The foreign Super E® Designate submits a Notice of Intent to the Super E office to build a Super E House prior to the start of construction.

	<ul style="list-style-type: none"> - The Super E Designate builds a Super E® House with its Canadian partner. If the house is completed and successfully registered, the company becomes a full member. - Must attend the Annual Super E Forum (to discuss technical and marketing issues). - Must renew Super E® House Program membership annually.
	<p>Training requirements: The following requirements apply to Canadian builders:</p> <ul style="list-style-type: none"> - Must be trained in energy efficient, healthy housing or R-2000 construction techniques. - Must have on staff at least one Super E and R-2000 trained individual who must take part in every Super E House Project. <p>In addition, Canadian builders must have the following specified qualified personnel or specified alternative:</p> <ul style="list-style-type: none"> - HRAI ventilation system installer or access to an R-2000 or Super E Professional. - A qualified blower door tester or access to R-2000 or Super E Professional (a designation by the Super E® House Program of a person who has knowledge, understanding and experience in applying R-2000 and Super E design and construction principles and who is knowledgeable about the Super E House Program and the specific needs of Super E members). - A person qualified to operate the HOT2000/HOT 2XP program or access to an R-2000 or Super E Professional. - A Super E Design Professional or access to one.
	<p>Marketing Requirements: Members must sign a license agreement in order to use the Super E® trademarks. If the trademarks are used in marketing materials, foreign members are required to submit copies through the Canadian Expert Affiliate to the Super E Office which will check to ensure that they comply with the Trademark License. - All documents produced by the Licensee shall prominently display the following notice: “Super E® House Program Trademarks reproduced under license from the Minister of Natural Resources Canada.”</p> <p>For the Japanese market, all marketing and technical documentation must be produced in English and Japanese.</p>
	<p>Ethical requirements: Companies participating in the Super E® Program must sign and adhere to the principles of the Code of Ethics for the Program. The Code includes the following provisions</p> <ul style="list-style-type: none"> - Clients must be treated with respect, honestly and in a timely manner. - The product will not be compromised. - The company will adhere to their requirements for participation.
Summary of Conditions / Implication of Program Label	<p>If the Licensee complies with all Super E® House Program requirements, NRCan grants the licensee non-exclusive, non-transferable, royalty-free license to use in Japan and the UK the Trademarks of the Super E® House Program.</p>

SUMMARY OF NOVOCLIMAT

PROGRAM FEATURES	DETAILS
Objective	<ul style="list-style-type: none"> - To encourage the construction and purchase of energy efficient and environmentally responsible new houses that include measures to address occupant health and safety. The specific objective of Novoclimat is to produce housing that is at least 25% more energy efficient than housing that complies with the Québec regulation for energy conservation in new buildings (Loi et Règlement sur l'économie de l'énergie dans les nouveaux bâtiments) which is based on the Model National Energy Code. - To transfer the knowledge base and the techniques of how to design and build energy efficient and sustainable residential buildings to members of the industry: designers, builders, HRVs installers and inspectors.
Status	<p>In 1980, the federal government, through Energy Mines and Resources (now Natural Resources Canada or NRCan) introduced the Super Energy Efficient Home Program (SEEH) to stimulate the rate of construction of more energy-efficient houses. This program became the R-2000 Program which was officially launched in 1982. L'Association provinciale des constructeurs d'habitations du Québec (APCHQ) has worked with NRCan to develop and deliver the program since its initiation. In 1996, Hydro-Québec developed a new program that is similar in objective and target to the R-2000 program, called Nouveau Confort that was also delivered with the collaboration of APCHQ. During that period the R-2000 program was still available in Québec but it was not promoted. In 1999 L'Agence de l'efficacité énergétique du Québec (AEE) took over the Nouveau Confort program and repackaged it into a new program labeled Novoclimat. AEE and NRCan have concluded an administrative and financial agreement for the inclusion of an R-2000 option in the Novoclimat program.</p>
Scope	<p>Three versions of the Novoclimat Standard have been developed. One standard, the Novoclimat House Standard (Maison Novoclimat) applies to single-family buildings (either attached or detached) with a maximum of 4 stories including basement. The second standard is the Novoclimat, Option R-2000 (Maison Novoclimat, Option R-2000). This applies to the same type of buildings as the Novoclimat House Standard. The third standard is the Novoclimat Standard for Multiple Family Buildings (Novoclimat Multifamiliale) and applies to dwellings built under Part 9 of the 1995 NBC (modified for Québec) in buildings where dwelling units share heated areas, ventilation systems or heating systems with other dwelling units. Those systems must comply with Part 6 of the 1995 NBC (modified for Québec).</p>
Program Sponsorship and Support	<p>The Novoclimat program and standard are owned and backed by L'Agence de l'efficacité énergétique du Québec (AEE). It has been developed and is managed by AEE staff. They have outsourced the delivery of the HRVs installation courses to the Corporation des maîtres mécaniciens en tuyauterie du Québec (CMMTQ). The Québec government, Hydro-Québec and Gas-Métro, RNCAN, support AEE efforts financially.</p> <p>The Standard is comprised of, and supported by, a number of components, as follows:</p> <ul style="list-style-type: none"> - A series of tools: Those that support builders include education materials, administration forms, a technical manual with illustration of all of the recommended (prescriptive) construction details, and lists of approved HRV, thermostats, kitchen and bathroom fans. - Service providers: The program is supported by L'Agence de l'efficacité énergétique du Québec (AEE) own staff and a group of independent inspectors hired on a contractual basis. Independent instructors also deliver an education program. - Technical support to builders and HRVs installers: AEE provides technical advice through its own staff and through a group of independent inspectors hired on a contractual basis to inspect, conduct air infiltration tests and provide on site, technical advice to builders. - Ongoing research, information exchange with NRCan as well as feedback from active participants and the housing industry that contributes to the improvement of the Novoclimat standard. - Training: AEE makes available education materials and requires workshop participation for key players. For example, builders must attend a two-day Builder Workshop and must successfully complete the exam. HRVs installers must attend a two-day Residential Mechanical Ventilation Installation course and must successfully complete the exam. Inspectors must attend the Novoclimat Builder Workshop and a Novoclimat Inspection Workshop and must successfully complete the exams. AEE also provides training to sales agents and designers. - Marketing support: This includes development of marketing strategies and promotional efforts to builders, consumers and the industry. The marketing is done by AEE (newspaper, magazine, TV,

	parade of homes and home shows).		
“House as a System” Considerations	<p>Novoclimat takes a systems approach to the design and construction of buildings. It views the building as a collection of interrelated systems that determine how the building performs. One manifestation of this approach is various requirements to ensure healthy indoor air that is particularly important because of the airtightness of the building envelope. The following examples illustrate this:</p> <ul style="list-style-type: none"> - Novoclimat houses require a balanced HRVs installation and provision for the compensation of the other extracting fans in order that the house will not be imbalanced and risk smoke or gas back draft. - Fuel fired space and water-heating appliances shall have either sealed direct-vent, induced-draft vent or forced venting systems with electronic ignition and shall be independently vented. Induced draft and forced-draft vented appliances shall be capable of positive shutdown in the case of venting system blockages. - Natural gas and propane fireplaces must be either direct vent (sealed) and top or rear vented, or power vented and shall also be capable of positive shut down in the case of venting system blockage. - Ventilation system must comply with either Part 9.32 or Part 6 of the 1995 NBC (modified for Québec) or CAN/CSA-F326 (which limits indoor/outdoor pressure imbalances) and make-up air is required if a wood-burning appliance is installed. 		
Technical Requirements and Features	<p>Novoclimat houses must meet all specified technical requirements (as well as other requirements) to be certified as Novoclimat houses. In that sense, it is a pass/fail program (rather than a scaled program).</p> <p>Technical requirements are contained in the Novoclimat standard. The Novoclimat standard is based on the Model National Energy Code, the National Building Code 1995 (modified for Québec) and some aspects of the R-2000 program. The requirements include measures for the efficient use of energy, improved indoor air quality (IAQ) and better environmental responsibility in the construction and operation of a house. The standard specifies prescriptive measures and a performance target (airtightness). The Novoclimat standard is periodically updated to ensure that Novoclimat houses represent the leading edge of cost-effective housing technology. The scope of the standard is the building envelope and mechanical systems, i.e., ventilation, heating and cooling systems. Updates are based on ongoing consultation with the industry members (builders and trade associations, builders, HRVs installers, manufacturers, technical consultants and NRCan) provides information for the regular update of the standard and the technical guide.</p> <p>General requirements: Novoclimat houses must meet all building code requirements. The Novoclimat standards are in addition to the 1995 National Building Code requirements (modified for Québec), municipal regulations and best practices by trades. The Novoclimat standard is a prescriptive standard except for the airtightness of the building (this comment applies to standard for Novoclimat houses which is different than the standard for Novoclimat Option R-2000 house, where more performance requirements apply). The success of the program is the simplification of the administration process (e.g., no Hot-2000 plan analysis is required; rather prescriptive requirements apply supported by a very detailed technical guide and by AEE staff).</p> <p>The following list of technical requirements are primarily summaries of the Novoclimat standard for single-family home with some inclusions for the R-2000 Option. The requirements for Novoclimat Multifamily standard are similar, except for the requirement to comply with Part 6 of the 1995 NBC (modified for Quebec) when the ventilation is centralized for many dwelling units.</p> <p>Building envelope requirements: These requirements focus on reducing energy use but they also affect indoor air quality. Energy use is reduced because envelope systems in Novoclimat houses incorporate higher levels of insulation and a degree of airtightness not normally achieved in conventional housing. Indoor air quality is also affected because the tighter envelope also allows a controlled ventilation system (with heat recovery, which also reduces energy use).</p> <p>The main requirements are highlighted below. The full requirements are contained in the complete French version of the standard.</p> <p>- Insulation levels:</p>		
		Novoclimat	Novoclimat R-2000 option
		RSI Total	RSI Total
	Ceiling	7.22	8.98
	Walls	4.31	5.1
		Insulation must be continuous and all structural elements that present a potential for thermal bridging must be covered with insulation. The required R-value in wall includes an insulation barrier of RSI 0.7 to cover the structural elements (inside or outside) when the structural members are 16 inches apart. If the structural members are 24 inches apart this insulation material can have an RSI value of 0.53.	Same note

	Basement walls	2.99 Full height Same thermal bridge coverage if a studding wall is installed.	Same
	Basement floors	0.88 if insulation is applied over the entire floor surface. 1.32 If the insulation is applied on a width of 4 foot over the perimeter area only. A thermal insulation material (RSI 0,88) must be installed at the end of the slab and between the slab and the footing to prevent for thermal bridging.	Same
	Wall between a heated space and a garage heated or not	3.52	Same
	Exposed floors	5.20	Same
<p>- Building airtightness levels: 1) No greater than 2.0 ACH at 50 Pascals for the Novoclimat. 2) No greater than 1.5 ACH at 50 Pascals for the Novoclimat, Option R-2000 and the multifamily building.</p> <p>- Windows must be at a minimum: double glazed, low-e, argon, insulated spacer and an airtightness that comply with CAN/CSA-440-M90 level A2.</p> <p>- Doors must be made of steel, insulated with polyurethane and meet the CAN/CGSB-82.5-M88 standard.</p> <p>Mechanical system requirements: These apply to energy efficiency and indoor air quality.</p> <p>- <u>Mechanical system requirements affecting energy use:</u></p> <ul style="list-style-type: none"> - Heating, cooling and distribution systems must be designed in accordance with recognized industry standards and good engineering practice (different standards are cited for different types of systems). - Water heaters (electric, natural gas or propane) must meet specific energy standards. Greywater heat recovery systems may be used. - All wood-burning appliances (fireplaces, wood stoves and pellet stoves; also masonry heaters) must be certified to specified standards (these standards reflect energy efficiency and safety concerns). - Ducts carrying outdoor air through a conditioned space must be insulated and have a sealed vapour barrier. <p>- <u>Mechanical system requirements affecting indoor air quality (and therefore also occupant health and safety):</u></p> <ul style="list-style-type: none"> - All types of fuel, except wood, can be use for the main heating system, but wood may be used for the secondary heating system. - Fuel fired space and water-heating appliances shall have either sealed direct-vent, induced-draft vent or forced venting systems with electronic ignition and shall be independently vented. Induced draft and forced-draft vented appliances shall be capable of positive shutdown in the case of venting system blockages. - Natural gas and propane fireplaces must be either direct vent (sealed) and top or rear vented, or power vented and shall also be capable of positive shut down in the case of venting system blockage (this is an occupant health issue). - Ventilation systems must meet either Part 9.32 or Part 6 of the 1995 NBC (modified for Québec) or CAN/CSA-F326, and be installed by an Novoclimat certified Residential Mechanical Ventilation Installer. - HRVs must be certified by the Home Ventilating Institute (HVI) and have a sensible recovery efficiency of 60% at -25°C (68% for Novoclimat, Option R-2000). When in the defrost mode the HRV shall not produce a depressurization of the house and the standard requires defrosting in the recirculation mode. - Inspectors must measure airflows at every grill (outtake and intake) of the HRV in each room to confirm that the system is balanced. - A kitchen fan of at least 160 CFM in mandatory. There are other specifications regarding the ventilation of every bathroom and other rooms. - A CO detector meeting specified standards shall be installed in a house containing combustion appliances or attached garages. - Wood burning appliances home that are susceptible to spillage are the only combustible appliances allowed in a Novoclimat house. - Unvented combustion appliances cannot be installed in Novoclimat houses. <p>Other requirements to contribute to good indoor air quality: The standard encourages the selection of products that have no or limited emissions of noxious substances. Water based paints shall be used on all surfaces that are to be painted. Central vacuum system shall exhaust to the outside.</p>			

	<p>Environmental requirements: The following requirements use resources efficiently and reduce environmental impact.</p> <ul style="list-style-type: none"> - Plumbing fixtures (toilets, showers and faucets) must meet criteria to reduce water use. - An on/off switch located inside must control all outside lights and electric apparatus.
Quality Assurance Measures	<p>Quality assurance is achieved through 1) audits or checks of the house by qualified*, independent third parties on the house's compliance with specific standards, 2) requirements for the people who build, work on and examine Novoclimat houses to have specified qualifications and corresponding training requirements and 3) the consistent use of credible procedures and equipment.</p> <p>* Novoclimat specifies training and licensing requirements for the following key members of the Novoclimat delivery system: airtight testers/inspectors, builders, mechanical ventilation system designers and installers.</p> <p>The following list highlights the main quality assurance measures:</p> <p>Examinations by Service Providers</p> <ul style="list-style-type: none"> - Plan Evaluators: Plan evaluation is done by the AEE technical staff to help the builder determine that the Novoclimat house complies with the Novoclimat technical requirements at the design stage. There is no Hot-2000 analysis required since the insulation requirements are prescriptive. - Inspectors: The purpose of the inspection is to ensure that the house as built conforms to the Novoclimat standards. The inspector is also responsible for the infiltration test. They conduct the airtightness test in accordance with the CGSB-149.10-M86 standard method for determining the airtightness method of building envelopes, i.e., the blower door test. The airtightness tester also conducts a fan depressurization test, when it is required. This test is required if the HRV or other ventilation system is out of balance by more than 10% at the TVC airflow rate. The test is intended to confirm that the mechanical ventilation system has been designed, installed and balanced to meet the positive and negative pressure requirements. Depressurization testing and the installation of a make-up air duct would only be required if a wood-burning appliance is installed. <p>Practitioner qualifications: All of the key practitioners must meet Novoclimat requirements. This means that builders and service providers must meet all of the requirements to be licensed. In addition, ventilation systems must be installed by a certified Residential Mechanical Ventilation Designer or Installer.</p> <p>Equipment standards: HRVs must be certified by the Home Ventilating Institute (HVI).</p>
Builder Qualifying Requirements	<p>Licensing and other qualifying requirements:</p> <ul style="list-style-type: none"> - To be a Novoclimat builder, a builder must be licensed. To be a licensed builder, a builder must have the proper provincial licensing, be an accredited builder by one of the home warranty programs, must successfully complete a Novoclimat Builder Workshop (pass the examination with a minimum mark of 68%, and attend Novoclimat Builder Updates. - The builder must designate at least one person in the company who is licensed and trained as a Novoclimat builder to represent the company. - An active Novoclimat builder (one who has completed the qualifying process and is actively engaged in building Novoclimat houses) must build and obtain Novoclimat certification for at least one Novoclimat house every year. <p>Costs: There is no cost for the builder and the HRVs installer except for the education program.</p> <p>Marketing Requirements: Active Novoclimat builders are responsible for promoting Novoclimat benefits to their clients, educating clients about Novoclimat technology and encouraging them to purchase houses built to the Novoclimat standard. The marketing messages used by active Novoclimat builders must be consistent with the marketing messages used by AEE.</p> <p>Ethical Requirements: All Novoclimat licensed persons, companies and organizations must abide by the code and accordingly comply with the Novoclimat standard, exercise their duties with honesty, and avoid conflicts of interest.</p>
Summary of Conditions for / Implications of Program Label	<p>A Certified Novoclimat home is a home 1) constructed by a licensed Novoclimat builder that 2) meets the Novoclimat standard as built and as determined by a successful completion of the Novoclimat quality assurance process, consisting of inspection of the building envelope and mechanical systems and airtight testing, and that has been issued a certificate by AEE.</p>

SUMMARY OF ENERGUIDE FOR HOUSES (EGH)

Note to reader: The EnerGuide for Houses Program has two components: one for existing houses, referred to as EnerGuide for Houses (EGH) and one for new houses, referred to as EnerGuide for New Houses (EGNH). The following description focuses on EGH. The Program for new houses is described separately under the heading “EnerGuide for New Houses (EGNH)”.

PROGRAM FEATURES	DETAILS
Objectives	The objective of EGH is to increase the energy efficiency of low-rise housing across Canada (the set goal is to achieve energy use reduction by 20% in existing houses). The purpose of the EGH evaluations is to encourage energy efficiency improvements while maintaining or improving a house’s indoor environment and durability in order to reduce the impact of housing on the environment.
Status	The EnerGuide for Houses (EGH) Program was initiated in April 1998. In August 2003, the EGH program for existing homes was augmented by the introduction of financial incentives. Since then, grants for retrofit work of up to \$3,348 are available. As of April 2004, about 98,000 houses had been evaluated; about 12% of these houses have been retrofitted. Labelling for new homes also became available in the marketplace in 2003.
Scope:	The Program applies to low rise dwelling units built under Part 9 of the National Building Code (NBC) that do not share heated areas, ventilation systems or heating systems with other dwelling units (with some exceptions), meet the requirements of provincial codes or the NBC, and be complete and habitable. The Program described here applies to existing dwellings.
Program Sponsorship and Support	<p>The EGH Program was developed and is managed by the Office of Energy Efficiency (OEE) of Natural Resources Canada (NRCan) with support from CMHC. NRCan is responsible for the Program and has developed a delivery system that involves service organizations and energy advisors. The roles of NRCan and these members of the delivery team include the following:</p> <p>Key NRCan Roles</p> <ul style="list-style-type: none"> - Manage delivery of EGH nationally. - Provide support materials, including evaluation software to service organisations. - Maintain a national quality assurance program. - Provide national marketing strategies and products to promote brand awareness of EGH to homeowners, building professionals and key influencer groups. - Support and maintain an EGH database. <p>Key Roles for Service Organizations</p> <ul style="list-style-type: none"> - Recruit energy advisors, administer their certification and guarantee the integrity and administration of the EGH service at the local or regional level for existing houses. - Provide house evaluation files to NRCan for the EGH database - Report immediately to NRCan when an energy advisor has recognized a serious problem in a home and the service organizations has decided not to issue a label. - Maintain the quality assurance processes set out by NRCan. <p>Key roles for Energy Advisors</p> <ul style="list-style-type: none"> - Perform on-site evaluations and recommend energy efficient improvements to the homeowner - Deliver evaluation reports and rating labels to the homeowner. - Report the discovery of a serious condition in a house to the service organization and inform the homeowner that a label will be withheld until the problem has been fixed. - Encourage homeowners in the completion of the recommended improvements.
“House As A System” Considerations	EGH evaluations and recommendations are based on a “house as a system” concept. This concept means recognizing that changes to one part of a house may affect another part. It means that recommendations for energy efficiency upgrades must not negatively affect the house’s structural integrity or the health and safety of the house’s occupants, e.g. recommending basement insulation only if there are not water infiltration/dampness problems in the basement.
Technical Requirements and Features	<p>The EGH Program does not set energy efficiency targets. It is a scaled program, which provides a rating of a house’s energy efficiency. EGH provides the following services:</p> <p>Services for Existing Houses/Homeowners</p> <ul style="list-style-type: none"> - Initial evaluation of existing houses: This evaluation includes the following information: 1) current rating (based on information collected by the energy advisor), 2) estimated energy consumption by end use and costs, 3) estimates of heat loss by component, and 4) recommendations for energy

	<p>improvements that would be most beneficial, along with estimated energy savings and a rating that would accrue from the upgrades.</p> <ul style="list-style-type: none"> - Energy rating: The rating applies to the house and its permanent equipment, not the occupants and their lifestyle-related energy consumption. - Evaluation after retrofit work: This service is available and includes revised energy consumption and heat loss tables, a revised rating, identification of outstanding upgrades from the first evaluation and newly recommended upgrades. <p>An airtightness test using prescribed methods must be carried out on each house and the results affect the rating.</p> <p>Technical Comments about Indoor Air Quality (IAQ) Assessments and Recommendations</p> <p>The EGH service does not address issues of air quality directly, but it does include services that help to provide good indoor air quality and deal with related issues of health and safety; in houses before and after upgrades because the procedures and tests used by the energy advisors enable them to pre-determine the effects of upgrade recommendations on IAQ, ventilation and potential for combustion spillage, as outlined below (these measures are also part of the quality assurance measures):</p> <ul style="list-style-type: none"> - <u>Ensuring adequate ventilation</u>: The EGH service makes recommendations to help ensure that all houses evaluated are adequately ventilated. Based on information provided by the energy advisor, the software program will specify additional mechanical ventilation, if needed, during the critical heating month (this month is identified by the Program and is dependent on location) when the total minimum average ventilation is lower than the target of 0.30 ac/h. The software will also ensure that the ventilation is adjusted to the house's volume. - <u>Assessing the potential for combustion spillage</u>: Energy advisors are required to determine whether the operation of exhaust devices in the house will result in negative pressures large enough to create the potential for combustion spillage. A quick spillage test shall be performed for all houses that have heating appliances that are susceptible to combustion-gas spillage with a vertical chimney (solid fuel or oil systems). Depressurization test protocols are specified. Where combustion-spillage susceptibility is noted, the energy efficiency evaluation report should state the existence of a potential problem. Where there is evidence of combustion spillage or flue blockage, the energy advisor shall recommend that the homeowner contact a qualified heating and cooling specialist to investigate the problem. Where installed combustion appliances do not vent to the outdoors, a health and safety warning shall be included on the EGH label and in the energy efficiency evaluation report provided to the homeowner.
Quality Assurance Measures	<p>The EGH Program has adopted a number of quality assurance measures as outlined below:</p> <p>Procedures to help ensure that predicted performance is met and that unsafe conditions do not arise: House evaluations are carried out in accordance with specific and consistent procedures. These include consistent use of specified software programs (HOT2XP or HOT 2000) to assess energy consumption and ventilation requirements, specified procedures for conducting airtightness testing and specified protocols for conducting depressurization tests which will warn of potential combustion spillage problems or susceptibility.</p> <p>Qualified personnel</p> <ul style="list-style-type: none"> - Service organizations must adopt methods for certifying and decertifying energy advisors approved by NRCan. - Service organizations review a sample of energy advisors' work, including the evaluations and the upgrade recommendations. - Energy advisors are trained in the following topics: 1) the "house as a system" concept, 2) factors affecting indoor air quality, 3) moisture problems, 4) measuring air tightness, 5) types of mechanical ventilation and heating systems, 6) reporting potential combustion spillage problems and 7) recommended insulation levels. <p>Audits/checks by independent third parties</p> <ul style="list-style-type: none"> - NRCan contracts quality assurance auditors to assess the performance of service organizations through: 1) client surveys, 2) file assessments and 3) on-site evaluations.
Qualifying Requirements	<p>The following comments apply in particular to EGH.</p> <p>Licensing requirements: Everyone offering or promoting the EGH service is required to have a license agreement with NRCan in place.</p> <p>Costs are market dependent. Costs to homeowners for evaluations before and after retrofits vary from \$75 to \$250.</p> <p>Marketing requirements: NRCan requires inclusion of the following messages in their marketing materials regarding EGH: 1) EGH is a service developed by NRCan or the Government of Canada, 2)</p>

	<p>reducing energy use in houses is part of Canada’s climate change solution to reduce the amount of GHG emissions, and 3) EGH is a service subsidized by NRCan or the government of Canada.</p> <p>Ethical requirements: These apply to all individuals and organizations associated with EGH. The requirements include the following: 1) exercise duties with integrity, fairness and impartiality, 2) avoid real and perceived conflicts of interest and contact with any enterprise of questionable character and 3) recommend to existing homeowners that they obtain more than one bid.</p>
<p>Summary of Conditions for / Implications of Program Label.</p>	<p>The EnerGuide for Houses (EGH) energy efficiency rating label provides homeowners with a Government of Canada energy efficiency label rating that enables them to compare the efficiency of houses in their region and across Canada. The EGH energy efficiency rating indicates the house’s energy performance and is measured on a scale of 0-100. The higher the number, the more energy efficient the house.</p> <p>Typical ratings:</p> <ul style="list-style-type: none"> 0-50 Old house not upgraded 51-65 Upgraded old house 66-74 Energy efficient old house or typical new house 75-79 Energy efficient new house 80-90 Highly energy-efficient new house 91-100 House requiring little or no purchased energy

SUMMARY OF ENERGUIDE FOR NEW HOUSES (EGNH)

Note to reader: The EnerGuide for Houses Program has two components: one for existing houses, referred to as EnerGuide for Houses (EGH) and one for new houses, referred to as EnerGuide for New Houses (EGNH). The following descriptions focuses on EGNH, but includes some comments on EGH to provide context. The Program for existing houses is described separately under the heading “EnerGuide for Houses (EGH)”.

PROGRAM FEATURES	DETAILS
Objectives	The objective of the EnerGuide for Houses (EGH) Program is to increase the energy efficiency of low-rise housing across Canada (the set goal is to achieve energy use reduction by 20% in existing houses and to achieve a rating of EGH 80 for all new houses by the year 2010. The purpose of the EGNH evaluations is to encourage energy efficiency improvements while maintaining or improving a house’s indoor environment and durability in order to reduce the impact of housing on the environment.
Status	The EGH Program was initiated within the retrofit market in April 1998. In 2003, the EnerGuide for New Houses service was introduced for new home builders and new home buyers who were interested in incorporating energy efficiency upgrades to their future homes.
Scope:	The EGNH Program applies to low-rise dwelling units built under Part 9 (and Part 3 for mobile homes only of the National Building Code (NBC) that do not share heated areas, ventilation systems or heating systems with other dwelling units (with some exceptions), meet the requirements of provincial codes or the NBC, and be complete and habitable.
Program Sponsorship and Support	<p>The EGNH Program was developed and is managed by the Office of Energy Efficiency (OEE) of Natural Resources Canada (NRCan). NRCan has developed a delivery system that involves service organizations that manage the field delivery of the Program. The roles of NRCan and members of the delivery team include the following:</p> <p>Key NRCan Roles</p> <ul style="list-style-type: none"> - Provide support materials, including evaluation software to delivery agents. - Support and maintain an EGH database. - Maintain a national quality assurance program. - Provide national marketing strategies and products to promote brand awareness of EGNH to home buyers, builders, building professionals and key influencer groups. <p>Key Roles for Service Organizations</p> <ul style="list-style-type: none"> - Recruit energy advisors, administer their certification and guarantee the integrity and administration of EGNH at the local or regional level. - Provide house evaluation files to NRCan for the EGH database - Report immediately to NRCan when an energy advisor has recognized a serious problem in a home and the service organizations has decided not to issue a label. - Maintain the quality assurance processes set out by NRCan. - Provide a one-year marketing plan for the EGNH service. - Recruit and train new home builders to develop and offer energy upgrade packages in new houses. <p>Key roles for Energy Advisors</p> <ul style="list-style-type: none"> - Upon completion of a pre-construction evaluation of a builder’s house plan, the energy advisor will, for each model requested, explain the evaluation, assist the builder in making appropriate builder upgrades to promote to their customers and provide recommendations that would achieve, wherever possible, an upgrade rating of 80 or more. - Perform on-site evaluations and recommend energy efficient improvements to their client. - Deliver evaluation reports and rating labels. - Report the discovery of a serious condition in a house to the service organization and inform the homeowner that a label will be withheld until the problem has been fixed.
“House As A System” Considerations	EGNH evaluations and recommendations are based on a “house as a system” concept. This concept means recognizing that changes to one part of a house may affect another part. It means that recommendations for energy efficiency upgrades must not negatively affect the house’s structural integrity or the health and safety of the house’s occupants, e.g., poor or unsafe indoor air quality because of combustion spillage or the presences of air-borne pollutants or excessive moisture.

<p>Technical Requirements and Features</p>	<p>The EGNH Program does not set energy efficiency targets. It is a scaled program, which provides a rating of house’s energy efficiency. EGNH provides the following services:</p> <ul style="list-style-type: none"> - Evaluation of house plans and development of upgrade packages: An initial evaluation is provided (based on information about the plan collected by the energy advisor) which includes upgrades that have been developed by the builder or homeowner with the advice of the energy advisor. It becomes the basis for comparison with the as-built house (which incorporates the upgrades). - Evaluation of the house as built: It will include information on the estimated annual energy consumption by end use, energy costs, estimated heat loss by component, and energy-saving tips for maintaining the efficiency of a new house. - Provision of an energy rating for the completed house: The rating applies to the house and its permanent equipment, not the occupants and their lifestyle-related energy consumption. <p><u>An airtightness test using prescribed methods must be carried out on each house</u> and the results affect the rating.</p> <p>Technical Comments about Indoor Air Quality (IAQ) Assessments and Recommendations</p> <p>The EGNH service does not address issues of air quality directly, but it does include services that help to provide good indoor air quality and deal with related issues of health and safety. The procedures and tests used by the energy advisors enable them to pre-determine the effects of upgrade recommendations on IAQ, ventilation and potential for combustion spillage, as outlined below (these measures are also part of the qualify assurance measures):</p> <ul style="list-style-type: none"> - <u>Ensuring adequate ventilation</u>: Based on information provided by the energy advisor, the software program will specify additional mechanical ventilation, if needed, during the critical heating month (this month is identified by the Program and is dependent on location) when the total minimum average ventilation is lower that the target of 0.30 ac/h. The software will also ensure that the ventilation is adjusted to the house’s volume. NRCan will not authorize the production of a label for a new house that has a combined natural and mechanical ventilation rate of less than 0.15 ac/h during the critical month. - <u>Assessing the potential for combustion spillage</u>: A quick spillage (depressurization) test shall be performed for all houses that have heating appliances that are susceptible to combustion-gas spillage (with a vertical chimney, solid fuel of oil systems). The quick depressurization test does not necessarily confirm the backdrafting or combustion spillage will or will not occur. It will only alert the builder to a house depressurization of 5 Pa or more when all exhaust fans are operating. Depressurization test protocols are specified (in the advisors’ manual). The installation of a CO detector is mandatory if the quick depressurization test results show a depressurization greater than 5 Pa. Where combustion-spillage susceptibility is noted, the energy efficiency evaluation report and label should state the existence of a potential problem. If depressurization of more than 10 Pa is found, the label would not be issued for the house. Where there is evidence of combustion spillage or flue blockage noticed during the evaluation, the energy advisor shall recommend that the homeowner/builder contact a qualified heating and cooling specialist to investigate the problem. Where installed combustion appliances do not vent to the outdoors, a health and safety warning shall be included on the EGNH label and in the EGNH energy efficiency evaluation report provided to the homeowner.
<p>Quality Assurance Measures</p>	<p>The EGNH Program has adopted a number of quality assurance measures that are outlined below:</p> <p>Procedures to help ensure that predicted performance is met and that unsafe conditions do not arise: Plan and house evaluations are carried out in accordance with specific and consistent procedures. These include consistent use of specified software programs (HOT2XP or HOT 2000) to assess energy consumption and ventilation requirements, specified procedures for conducting airtightness testing and specified protocols for conducting depressurization tests which will warn of potential combustion spillage problems or susceptibility.</p> <p>Qualified personnel</p> <ul style="list-style-type: none"> - Service organizations must adopt methods for certifying and decertifying energy advisors approved by NRCan. - Service organizations review a sample of energy advisors’ work, including the evaluations and the upgrade recommendations. - Energy advisors are trained in the following topics: 1) the “house as a system” concept, 2) factors affecting indoor air quality, 3) moisture problems, 4) measuring air tightness, 5) types of mechanical ventilation and heating systems, 6) reporting potential combustion spillage problems and 7) recommended insulation levels.

	<p>Audits/checks by independent third parties</p> <ul style="list-style-type: none"> - NRCan contracts quality assurance auditors to assess the performance of delivery agents through: 1) client surveys, 2) file assessments and 3) on-site evaluations. - Service organizations review a sample of energy advisors' work, including the evaluations and the upgrade recommendations.
<p>Builder Qualifying Requirements</p>	<p>Licensing requirements: New home builders who work with EGNH to offer energy upgrade packages to their clients are required to have a license agreement with NRCan in place.</p> <p>Costs: Approximately \$75 to \$150 per plan or as –built evaluation, but this price varies regionally.</p> <p>Marketing requirements:</p> <ul style="list-style-type: none"> - New home builders who participate in EGNH must 1) offer new home buyers one EGNH evaluation for some of all of their company's new homes at the design stage and follow-up with an as-built EGNH evaluation for homebuyers who purchase this service, and 2) train their sales personnel in the marketing of energy upgrade packages by promoting the inclusion of energy upgrade packages in some or all of the homes they build. - New home builders are required to forward communications materials that use the EnerGuide marks to their associated service organization for review each year. - NRCan requires inclusion of the following messages in their marketing materials regarding EGNH: 1) EGNH is a service developed by NRCan or the Government of Canada, 2) reducing energy use in houses is part of Canada's climate change solution to reduce the amount of GHG emissions, and 3) EGH is a service subsidized by NRCan or the government of Canada. <p>Ethical requirements: These apply to all individuals and organizations associated with EGNH. The requirements include the following:</p> <ul style="list-style-type: none"> - Exercise duties with integrity, fairness and impartiality. - Avoid conflicts of interest and contact with any enterprise of questionable character. - Builders cannot act as energy advisors in the as-built evaluations of houses they have constructed to keep the arm's length relationship with the homeowner.
<p>Summary of Conditions for / Implications of Program Label.</p>	<p>The EnerGuide for New Houses (EGNH) energy efficiency rating labels provide homeowners with a Government of Canada energy efficiency label rating that enables them to compare the efficiency of houses in their region and in Canada. The EGNH energy efficiency rating indicates the house's energy performance and is measured on a scale of 0-100 (the whole scale appears on an existing house label and the range from 65 to 100 appears on the EGNH house label. The higher the number, the more energy efficient the house.</p> <p>Typical ratings:</p> <ul style="list-style-type: none"> 0-50 Old house not upgraded 51-65 Upgraded old house 66-74 Energy efficient old house or typical new house 75-79 Energy efficient new house 80-90 Highly energy-efficient new house 91-100 House requiring little or no purchased energy

SUMMARY OF BUILT GREEN™ ALBERTA

PROGRAM FEATURES	DETAILS
Objective	To reduce the impact that building has on the environment by encouraging homebuilders to use technologies, products and practices that will 1) provide greater energy efficiency and reduce pollution, 2) provide healthier indoor air, 3) reduce water usage, 4) preserve natural resources and 5) improve building durability and reduce building maintenance.
Status	CRHBA launched Built Green™ Alberta on October 2003.
Scope:	The scope of Built Green™ Alberta is generally the same as the scope of the EnerGuide for New Houses (EGNH) Program, i.e., the program applies to low-rise dwelling units built under Part 9 of the National Building Code (NBC) that do not share heated areas, ventilation systems or heating systems with other dwelling units (with some exceptions), meet the requirements of provincial codes or the NBC, and be complete and habitable. However, the program scope can include multi-unit buildings up to 50 units.
Program Sponsorship and Support	Built Green™ Alberta is owned and managed by the Calgary Regional Home Builders' Association (CRHBA). Built Green™ Alberta utilizes the EnerGuide for New Houses Program (EGNH) developed by Natural Resources Canada (NRCan) and delivered in Alberta by Enervision as the basis for the energy efficiency component of the program. Accordingly, it utilizes EGNH software for calculating energy consumption and energy ratings, EGNH quality assurance measures and EGNH requirements for the energy-rating label. This means that the Built Green™ Alberta Program is backed by the CRHBA and the EGH component is backed by Natural Resources Canada (NRCan).
Technical Requirements and Features	<p>The Program concentrates on four target areas: 1) energy efficiency, 2) indoor air quality, 3) resource use (including waste management) and environmental impact. It is a scaled program and recognizes three levels of achievement. The requirements of each level are summarized below:</p> <ul style="list-style-type: none"> - Bronze level: Requires an EGNH rating of 72 (which counts for 20 points) plus 60 additional points for a total of 80 points. - Silver level: Requires an EGNH rating of 75 (which counts for 25 points) plus 65 additional points for a total of 90 points - Gold level: Requires an EGNH rating of 77 (which counts for 30 points) plus an additional 70 points for a total of 100 points. <p>The EGH rating provides a measure of the energy efficiency of the dwelling. It is calculated using either the HOT2000 or HOT2PX software. The rating is based on home orientation, home dimensions, insulation values, type of heating system, construction material, window type and window design. The program uses an average air change rate for calculating the rating initially. Prior to the completion of each house, a mandatory blower door test is performed and the final EGH rating is calculated using the actual air change rate (see the description of EGH for more details) and the actual orientation.</p> <p>The additional points are achieved by selecting items from the Built Green™ Alberta Checklist. These items contribute to the other program target areas (indoor air quality, resource use and environmental impact), as well as efficiency. The program is structured to require a minimum number of points in each of six categories, as illustrated below:</p> <ul style="list-style-type: none"> - Operational systems (minimum of 13 points required out of a possible total of 92) - Building materials (minimum of 12 points required out of a possible total of 49). - Exterior and interior finishes (minimum of 10 points required out of a possible total of 92). - Indoor air quality (minimum of 12 points required out of a possible total of 61). - Waste management (minimum of 7 points required out of a possible total of 25). - Water conservation (minimum of 6 points required out of a possible total of 15). <p>This program structure offers flexibility to customers and builders in that they can choose a wide range of “green” options. Also, the program is evaluated and updated continuously to assure information is current.</p>
“House As A System” Considerations	See comments in the description of EGNH.
Quality Assurance Measures	The comments on quality assurance measures in the description of the EGNH Program apply. In addition five % of all homes registered under Built Green™ Alberta are inspected by a third party “rater” (energy advisors, as defined in the EGNH Program), for compliance with the green features in the checklist.

<p>Builder Qualifying Requirements</p>	<p>Eligibility: Members of CRHBA, including builders, renovators, suppliers, service providers and developers are eligible to be members of Built Green™ Alberta (but Built Green™ Alberta builder members are not required to build every home to meet the program criteria – they can participate at any level they choose).</p> <p>Training requirements: A training program is required for builders and renovators comprised of the following parts:</p> <ul style="list-style-type: none"> - An optional one-half day orientation for one person of a company. It includes an overview of the program, and a review program goals and practices. - A mandatory two-day Built Green™ Alberta training program offered at the Southern Alberta Institute of Technology (SAIT) and delivered by Enervision. The foundation of the program is the R2000 builder-training curriculum. Students must pass this course with a mark of not less than 75%. Candidates who are successful in this course receive a certificate that classifies the company as an R2000-trained builder. - Plan evaluation training (optional): This program uses EnerGuide for New Houses computer program HOT2000. - A one-half day updating course must be taken every two years. <p>In addition, the program offers an optional Built Green™ Advantage Package that includes benchmarking of existing construction practices (software plan evaluation and blower door test), an upgrade package (which includes tips on best practices for construction supervisors and trades) and training assessment and recommendations customized to the registered company. Other customized training packages are available.</p> <p>Certification/licensing requirements: Only certified Built Green™ Alberta builder members can build a Built Green™ Alberta home. In addition and because Built Green™ Alberta is based on EGNH, new home builders who offer energy upgrade packages to their clients are required to have a license agreement with NRCan in place (in accordance with the requirements of EGNH).</p> <p>Costs:</p> <ul style="list-style-type: none"> - Builder/renovator membership: Initiation fee \$500; second year renewal fees: about \$150. The initiation fee includes a half-day presentation, a two-day Built Green™ Alberta Training course and plan evaluation training for one company representative. As an alternative to taking the plan evaluation course, a builder may hire a Plan Evaluation consultant for about \$250 per house. - Manufacturer, supplier and developer membership: \$150. - Built Green™ Alberta Advantage Builder Package: \$400 for Built Green™ Alberta members, but the cost is refunded when five or more company representatives register in Built Green™ Training. - House registration costs are \$100 per house, which includes the cost of the blower door test. <p>Marketing requirements: The requirements for EGH apply (see comments in the summary of EnerGuide for Houses).</p> <p>Ethical requirements: Commitment to a code of ethics is required. The main requirements are paraphrased below:</p> <ul style="list-style-type: none"> - Conduct business with honesty, integrity and humanity. - Promote good corporate and individual civic responsibility by instituting environmentally friendly programs. - Pursue and empower others to seek products and practices that represent environmentally friendly construction. - Be willing to share with others knowledge of new technology and practices that will advance environmentally friendly construction. - Strive to minimize governmental and third party interference in the operation of our business by proactively using all products and practices that promote environmentally friendly construction.
<p>Summary of Conditions for / Implications of Program Label</p>	<p>Members of Built Green™ Alberta who have 1) completed the Built Green™ Alberta Training, 2) developed the options package using the Built Green™ Checklist, 3) evaluated the plan to be enrolled in the program, 4) registered the house plan with Built Green™ Alberta, and 5) arranged for a blower door test prior to homeowner possession receive EnerGuide for New Houses rating label and an official Built Green™ seal for the Built Green™ Alberta home.</p>

SUMMARY OF LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED™)

PROGRAM FEATURES	DETAILS
Objective	<p>Leadership in Energy and Environmental Design (LEED™) is a US and Canada-based voluntary rating system for developing sustainable commercial, institutional and high-rise residential buildings. It has the following specific objectives:</p> <ul style="list-style-type: none"> - To define “green building” by establishing a common standard of measurement for North American projects. - To promote integrated, whole building design practices. - To recognize environmental leadership in the building industry. - To stimulate “green” competition. - To raise consumer awareness of “green” building products. - To transform the building market.
Status	<p>Origin of the LEED™ Rating System In 1993, a broadly based group of industries and professionals in the US established a non-profit organization called the US Green Building Council (USGBC). Its purpose was “to accelerate the adoption of green building practices, technologies, policies, and standards.” The work of the USGBC was carried out with funding assistance through a contract with the US Department of Energy and resulted in the development of the LEED™ Standard version 1.0 for New Construction and Major Renovations rating system.</p> <p>Since then, a number of developments have occurred and are occurring in terms of geographic areas of application of the standard and the scope of buildings to which it applies.</p> <p>Further Developments in the US The LEED™ rating system has been developed and applied to commercial, institutional and high-rise residential buildings in the US for years. In 2000, the USGBC formed a Steering Committee (LEED-Homes Committee) to work on the development of a LEED rating system for houses (LEED-H). In 2002, representatives of a number of national organizations and federal agencies, e.g., Building America, NAHB, Sustainable Buildings Industry Council (SBIC) Energy and Environmental Building Association (EEBA) concluded that LEED-H must be devised to provide mutual benefits to USGBC and existing local green building programs. This goal has been maintained. In 2003, a Coalition of Green Building Programs (CGBP) was formed, primarily representing entities that develop and administer green homebuilding programs at the local, state or regional level. The current LEED-Homes Committee formed in 2003 includes several members of the CGBP. As of January 2004, the USGBC, through its LEED Homes Committee, was working on an all-new LEED rating and certification system for houses (LEED-H). It will adopt goals similar to the LEED program for commercial buildings. It will be a nationally recognized rating system intended to bring about more environmentally responsible, healthy and efficient homes into the market. LEED-H will consist of a national green rating procedure suitable for implementation in those parts of the US where one does not already exist. Where a local green building program does exist, the USGBC intends to collaborate with the local organization to enhance the adoption of green practices by homebuilders. As of January 2004, the USGBC was screening proposals for a LEED Homes consultant to manage and process the development, pilot launch and initial implementation of the LEED Home Program.</p> <p>The USGBC has also developed other LEED products including rating systems for existing building operations, commercial interior projects and others.</p> <p>Developments in Canada In December 2002, a newly established Canada Green Building Council (CaGBC) was launched. CaGBC has signed a licensing agreement with the USGBC under which the organizations have worked together on the development of standards, processes, ideas and concepts to advance the state of green buildings across Canada. In accordance with this mandate, CaGBC has been developing LEED guidelines for Canada – referred to as LEED-Canada for New Construction and Major Renovations version 1.0 (or LEED Canada NC v.1.0) – adapted from USGBC LEED™ standard. LEED-Canada was approved by the USGBC in June 2004, and will soon be submitted to the CaGBC membership for their approval.</p> <p>In 2003, representatives from GVRD, City of Vancouver, the BC Provincial Government, BC Hydro and Terasen Gas developed a modified version of LEED (referred to as LEED-BC). LEED-BC was approved by the USGBC in July 2003 and is now operational. This means that LEED-BC has authority to certify projects under the LEED-BC standard.</p>

	<p>With the expected public launch of LEED Canada NC v.1.0 in late September 2004, CaGBC will have the authority to certify buildings under the LEED-Canada and LEED-BC rating systems. A LEED rating system for houses has not been developed in or for Canada.</p>
Scope	<p>The developed versions of LEED™, i.e., in the US or BC and the proposed LEED-Canada standard apply to the design, construction and renovation of commercial buildings, institutional buildings, and mid- and high-rise residential buildings.</p>
Program Sponsorship and Support	<p>The LEED™ standard and green building rating system is owned and supported by the USGBC. It has the authority to certify buildings. It can also approve other LEED standards, such as LEED-BC and LEED-Canada.</p> <p>Both the USGBC and the CaGBC offer workshops to train building designers, construction and management professionals to increase their green building expertise in using LEED. Candidates passing the LEED accreditation examination are awarded LEED Professional Accreditation.</p>
“House As A System” Considerations	<p>No comments are contained in documentation reviewed (this does not mean that the Program is not based on a systems approach).</p>
Technical Requirements and Features	<p>Overview</p> <p>The LEED™ building rating system consists of an explicit set of ecological, health and internal environment performance criteria that pertain to the design, construction and operation of buildings in five performance categories. The LEED™ rating systems specify prerequisite performance requirements and offer performance credits. These credits are the fundamental units for describing performance requirements within LEED™. Points are allocated to each credit and provide a basis for scoring building performance. The performance categories, number of available credits (C) and available points (P) are indicated below:</p> <ul style="list-style-type: none"> - Sustainable sites: C: 8/P: 14 - Water efficiency: C: 3/P: 5 - Energy and Atmosphere: C: 6/P: 17 - Materials and Resources: C: 7/P: 13 (LEED Canada NC v1.0 has modified this: C: 8/P: 14) - Indoor Environmental Quality: C: 8/P: 15 - A sixth category, Innovation and Design Process, (C: 2/P: 5) rewards exceptional environmental performance or innovation over and above that explicitly covered in the basic LEED standard. <p>The certified rating awarded a building is based on the aggregate number of points that it scores in the assessment. Credits and points are awarded only if performance requirements are met. The maximum number of points with the USGBC’s LEED NC v2.0 and 2.1 is 64 plus 5 for innovation. The designations are as follows:</p> <ul style="list-style-type: none"> - LEED™ Certified Platinum Level (52+) - LEED™ Certified Gold Level (39-51) - LEED™ Certified Silver Level (33-38) - LEED™ Certified (26-32). <p>The rating system shows that LEED™ is a combination of a scaled program (i.e., a program that rates buildings) and a pass/fail program (i.e., the building must achieve a rating of 26 to be LEED™ certified).</p> <p>LEED-Canada and LEED-BC are modeled after LEED™. They are structured in the same way, and include the same categories, and almost the same prerequisites and credits. Where appropriate, changes have been made to account for Canadian standards, terminology and units. LEED Canada and LEED-BC also address credit interpretations issued to date by USGBC and conditions unique to the Canadian context.</p> <p>Detailed Technical Requirements</p> <p>The main credit categories under each performance category of the LEED-Canada and LEED-BC rating system are outlined below:</p> <p><u>Sustainable Sites</u></p> <ul style="list-style-type: none"> - Prerequisite: Erosion and sedimentation control (LEED-BC has added a second prerequisite: Riparian Wetland Protection). <p>Credits are given for meeting specified criteria applicable to the following issues and elements:</p> <ul style="list-style-type: none"> - Site selection (LEED-Canada and LEED-BC criteria have changed the USGBC credits to an extent). - Development density - Redevelopment of contaminated site - Alternative transportation. Four sub-credits are identified: public transportation access, bicycle storage and changing rooms, alternative fuel vehicles and parking capacity.

- Reduced site disturbance. Two sub-credits are identified: protect or restore open space and development footprint)
- Stormwater management. Two sub-credits are identified: rate and quantity, and treatment
- Heat island effect: Two sub-credits are identified: non-roof and roof.

Water Efficiency

Credits are given for meeting specified criteria applicable to the following issues and elements:

- Water efficient landscaping. Two sub-credits are identified: reduce by 50% and no potable use or irrigation.
- Innovative wastewater technologies
- Water use reduction: Two sub-credits are identified: 20% reduction and 30% reduction.

Energy and Atmosphere

- Prerequisite: Fundamental building systems commissioning
- Prerequisite: Minimum energy performance
- Prerequisite: CFC reduction in HVAC equipment and elimination of halons.

Credits are given for meeting specified criteria applicable to the following issues and elements:

- Optimized energy performance
- Use of renewable energy
- Best practice commissioning (LEED-BC has changed this to read “additional commissioning”).
- Elimination of HCFCs and Halons
- Measurement and verification
- Use of green power

Materials and Resources

- Prerequisite: Storage and collection of recyclables

Credits are given for meeting specified criteria applicable to the following issues and elements:

- Building re-use. For LEED-BC, two sub-credit categories are identified: maintaining 75% of the shell and maintaining 95% of the shell/structure and 50% of the non-shell/non-structure.
- Construction waste management: Two sub-credits are identified: divert 50% from landfill and divert 75% from landfill.
- Resource reuse: Two sub-credit categories are identified: 5% salvaged materials and 10% salvaged materials
- Recycled content: Two sub-credit categories are identified: 5% (post-consumer plus ½ post industrial), and 10% (post-consumer plus ½ post industrial).
- Use of regional materials. Two sub-credit categories are identified: 20% manufactured regionally and 50% extracted regionally.
- Use of rapidly renewable materials.
- Use of certified wood.
- Durable building envelopes.

Indoor Environmental Quality

- Prerequisite: Minimum indoor air quality (IAQ) performance.
- Prerequisite: Environmental Tobacco Smoke (ETS) control.

Credits are given for meeting specified criteria applicable to the following issues and elements:

- Carbon dioxide (CO₂) monitoring
- Increased ventilation effectiveness
- Construction IAQ management plan. Two sub-credit categories are identified: during construction and before occupancy
- Use of low-emitting materials: Four sub-credit categories are identified: Adhesives and sealants, paints and coatings, carpets and composite wood.
- Indoor chemical and pollutant source control
- Controllability of systems. Two sub-credit categories are identified: perimeter zones and non-perimeter zones.
- Thermal comfort. Two sub-credit categories are identified: Compliance with ASHRAE Standard 55-1992 and permanent monitoring systems
- Daylight and views: Two sub-credit categories are identified: Daylight for 75% of spaces and views for 90% of spaces.

Innovation and Design Process

Credits are given for meeting specified criteria applicable to the following issues and elements:

- Innovation
- Involvement of a LEED-accredited professional.

Quality Assurance Measures	Supporting materials must be submitted with applications for certification. Relevant calculation procedures to demonstrate compliance with the credit requirements are contained in the LEED Reference Manual and attendant software.
Builder Qualifying Requirements	<p>Submittals: The certification review process requires applicants to submit all of the required materials, and the corresponding fee. Application materials include requested submittals for each prerequisite and credit, as well as those requested by assessors for audited credits. It also includes completion of a scorecard indicating the total score for the project.</p> <p>Costs: Two types of costs are incurred: registration costs and certification costs, and they vary by membership status and project size, as follows:</p> <p><u>Registration costs</u></p> <ul style="list-style-type: none"> - Projects less than 75,000ft² (6,969m²): CaGBC members: \$1,000; non-members: \$1,275. - Projects between 75,000ft² (6,969m²) and 300,000 ft² (27,870m²): CaGBC members: \$0.015/ft² (\$0.16m²); non-members: \$0.0165/ft² (\$0.178m²) - Projects larger than 300,000 ft² (27,870m²): CaGBC members: \$4,025; non-members: \$5,025 <p><u>Certification costs</u></p> <ul style="list-style-type: none"> - Projects less than 75,000ft² (6,969m²): CaGBC members: \$2,000; non-members: \$2,500. - Projects between 75,000ft² (6,969m²) and 300,000 ft² (27,870m²): CaGBC members: \$0.025/ft² (\$0.269m²); non-members: \$0.035/ft² (\$0.377m²). - Projects larger than 300,000 ft² (27,870m²): CaGBC members: \$8,050; non-members: \$10,050.
Summary of Conditions / Implications of Program Label	<p>To earn LEED certification, the applicant must satisfy all of the prerequisites and a minimum number of points to attain a LEED rating. In Canada, once LEED-Canada NC v1.0 is approved, means compliance with the following:</p> <ul style="list-style-type: none"> - The LEED-Canada or LEED-BC Building and Rating System requirements. - The LEED-Canada or LEED-BC prerequisites and credit structure. - The LEED-Canada or LEED-BC point structure and rating tiers.

SUMMARY OF THE ENERGY STAR PROGRAM

Note to reader: The Energy Star Program originated in the United States. Parts of the Program have been adopted in Canada. The program has a broad scope, and applies to many sectors, e.g., business, consumer products and the residential sector. Because the main purpose of this summary is to address interests of new home builders and also renovators in Canada, the summary will include a description of all of the components of the Program but will focus on those components that are Canadian and of greatest relevance to Canadian new home builders and also to Canadian renovators.

PROGRAM FEATURES	DETAILS
Objective	Energy Star is a US government-backed program that promotes energy efficiency in buildings and various products.
Status	<p>US Developments In 1992, the US Environmental Protection Agency (EPA) introduced Energy Star as a voluntary labelling program designed to identify and promote energy-efficient products to reduce greenhouse gas emissions. Computers and monitors were the first labelled products. By 1995, EPA expanded the labelling to additional office equipment products and residential heating and cooling equipment. In 1996, EPA partnered with the US Department of Energy (DOE) to develop requirements and labels for particular product categories. The Energy Star label now applies to more than 40 product categories, including major appliances, office equipment, lighting and home electronics. It also covers new homes, and commercial and industrial buildings. The Energy Star Program also provides home and building assessment tools so that homeowners and building managers can work toward greater energy and cost savings. By the end of 2003, more than 220,000 homes had been certified Energy Star, and the estimate for 2004 is for another 200,000 homes to be certified. A total of 3,000 builders in all 50 states participate in Energy Star. Half of the top US home builders use the Energy Star label and all new US Army houses are certified Energy Star.</p> <p>Canadian Developments Canada is one of several countries that have also adopted the Energy Star Program for some products. In Canada, appliances, office equipment, and more recently windows, sliding glass doors, heating and cooling equipment may be labelled Energy Star.</p>
Scope	<p>Scope of the US Energy Star Program Related to the Residential Sector</p> <ul style="list-style-type: none"> - New homes: Energy Star applies to detached houses and multi-unit buildings up to three storeys. All forms of construction qualify. Existing houses can qualify as well. - Existing homes: Remodelling advice is provided on a number of topics, e.g., kitchen, bathroom, addition, attic, etc. Two energy assessment instruments are also available: a quick-to-use instrument (5 minutes to complete) called “Home Energy Yardstick”, which indicates if house energy consumption is above average and a longer-to-use one (15 minutes to complete) called “Home Energy Advisor”, which also provides suggested energy improvements and estimated savings from them. Energy Star also provides information to help households improve housing energy efficiency and related problems. Information on the following topics is available: mould and mildew, damp basement, cold floors, drafty rooms, dust, moisture on windows, ice dams, peeling paint and dry winter air. - Products: The following residential-related products are eligible for the Energy Star label: <ul style="list-style-type: none"> - Appliances: clothes washers, dishwashers, refrigerators - Heating and cooling equipment, e.g., furnaces, programmable thermostats. - Home electronics - Lighting: compact fluorescent bulbs (CFBs) - Refrigerators and freezers - Roof products - Windows, doors and skylights. <p>Scope of the Energy Star Program Related to the Residential Sector in Canada In Canada, the Energy Star label can currently be obtained on the following product categories:</p> <ul style="list-style-type: none"> - Home appliances. - Heating, cooling and ventilating equipment. - Lighting and signage. - Windows and doors.

<p>Program Sponsorship and Support</p>	<p>Situation in the US Energy Star was developed in the US by the US Environmental Protection Agency (EPA) and is now managed and backed by the EPA in partnership with the US Department of Energy. In addition, the Program is currently supported by 160 utilities and states, 400 retailers and 2,000 home builders through partnership agreements. Energy Star also provides marketing support with promotional materials such as benefit fact sheets, features flyers, brochures, partner recognition, examples of cost advantages, environmental statements, benefit placards and sales guides.</p> <p>Situation in Canada Natural Resources Canada (NRCan) administers Energy Star in Canada in accordance with an agreement between NRCan and the EPA. NRCan is responsible for deciding which products will have Energy Star labels in Canada and has overall responsibility for quality assurance. Accordingly, NRCan determines what test methods are used and what specifications are stipulated for those products. For most products NRCan maintains databases to determine their compliance with energy efficiency regulations, and the same databases are used for Energy Star products. Natural Resources Canada (NRCan) promotes the international Energy Star symbol across Canada. Manufacturers and retailers of energy efficient products, utilities and energy retailers, all levels of government and industry groups also promote the symbol.</p>									
<p>“House As A System” Considerations</p>	<p>Not applicable to the Energy Star Program as it is applied in Canada.</p>									
<p>Technical Requirements and Features</p>	<p>Technical Requirements for Obtaining an Energy Star Label for New Homes in the US Energy Star new homes are at least 30% more energy efficient than homes built to the 1993 national Model Energy Code or 15% more energy efficient than state energy codes, whichever is more rigorous. If the Home Energy Rating System (HERS) is used, the house must achieve a rating of 86 (see Quality Assurance Measures for an explanation). This increased level of energy efficiency is typically met by a combination of the following three measures: - An energy efficient building envelope, i.e., improved insulation, airtight construction (airtightness levels are not prescribed) and high performance windows. - Energy efficient air distribution (airtight, well insulated ducts). - Energy efficient equipment (efficient heating and cooling equipment, and upgraded water heating equipment). In addition, energy efficient lighting is required in specified applications. Note 1: Mechanical ventilation is required only when the natural air infiltration is less than 0.35 ACH. Note 2: An R-2000 house exceeds the Energy Star requirements, i.e., R-2000 yields a rating between 89 and 91, depending and the level of duct leakage.</p>									
	<p>Technical Requirements for Products that are Energy Star Labelled in Canada Generally, technical requirements for products are harmonized with those in the US since many products are sold in both countries. Accordingly, EPA specifications may be the starting point, but it is possible that Canada could develop Energy Star specifications different from those developed by the EPA, as in the case of windows. In some cases, such as certain lighting, NRCan has added requirements specific to Canada. The following comments highlight requirements for products to qualify for the Energy Star label.</p> <table border="1" data-bbox="342 1465 1490 1883"> <thead> <tr> <th data-bbox="342 1465 558 1499">Product</th> <th data-bbox="558 1465 1490 1499">Requirement to Qualify for an Energy Star Label</th> </tr> </thead> <tbody> <tr> <td data-bbox="342 1499 558 1610">Clothes washers</td> <td data-bbox="558 1499 1490 1610">A Modified Energy Factor (MEF) of 40.1. This factor indicates that the clothes washer is 36% more efficient than the minimum energy performance standard in Canada’s Energy Efficiency Regulations. There is also a requirement to use less water than conventional models.</td> </tr> <tr> <td data-bbox="342 1610 558 1831">Refrigerators</td> <td data-bbox="558 1610 1490 1831"> <ul style="list-style-type: none"> - Standard-sized refrigerators must be at least 15% more efficient than the minimum federal performance standard in Canada’s Energy Efficiency Regulations. - Compact refrigerators must exceed the minimum government performance standard in Canada’s Energy Efficiency Regulations by at least 20%. - Standard-sized freezers must be at least 10% more efficient than the minimum federal performance standard in Canada’s Energy Efficiency Regulations. - Compact freezers must exceed the minimum government performance standard in Canada’s Energy Efficiency Regulations by at least 20%. </td> </tr> <tr> <td data-bbox="342 1831 558 1883">Dishwashers</td> <td data-bbox="558 1831 1490 1883">Must exceed the minimum federal performance standard in Canada’s Energy Efficiency Regulations by at least 25%.</td> </tr> </tbody> </table>		Product	Requirement to Qualify for an Energy Star Label	Clothes washers	A Modified Energy Factor (MEF) of 40.1. This factor indicates that the clothes washer is 36% more efficient than the minimum energy performance standard in Canada’s Energy Efficiency Regulations. There is also a requirement to use less water than conventional models.	Refrigerators	<ul style="list-style-type: none"> - Standard-sized refrigerators must be at least 15% more efficient than the minimum federal performance standard in Canada’s Energy Efficiency Regulations. - Compact refrigerators must exceed the minimum government performance standard in Canada’s Energy Efficiency Regulations by at least 20%. - Standard-sized freezers must be at least 10% more efficient than the minimum federal performance standard in Canada’s Energy Efficiency Regulations. - Compact freezers must exceed the minimum government performance standard in Canada’s Energy Efficiency Regulations by at least 20%. 	Dishwashers	Must exceed the minimum federal performance standard in Canada’s Energy Efficiency Regulations by at least 25%.
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	Dehumidifiers	<ul style="list-style-type: none"> - Standard capacity dehumidifiers (those that have a water-removal capacity of up to 35 litres per day) must have an Energy factor of at least 1.20, 1.30 or 1.50, depending on water removal capacity. - High capacity dehumidifiers (those that have a water-removal capacity of up to 36 to 47 litres per day) must have an Energy factor of 2.25 or higher. 			
	Bottled water coolers	Those that dispense cold water or both cold and room-temperature water must have standby energy consumption of no more than 0.16kWh/day (standby energy refers to Energy required to maintain the water at an appropriate dispensing temperature). Bottled water coolers that dispense both hot and cold water must have a standby energy consumption of no more than 1.2 kWh/day.			
	Room air conditioners	Must use at least 10% less energy than conventional models.			
	Central air conditioners	Must have a Seasonal Energy Efficient Ratio (SEER) of 12 or higher.			
	Residential furnaces (oil or gas)	Must have an annual fuel utilization efficiency (AFUE) rating of 90 or higher.			
	Air source heat pumps	Must have a heating seasonal performance factor (HSPF) of 7.6 or higher and a SEER 12 or higher.			
	Ground source heat pumps	Must meet or exceed the following minimum performance requirements:			
		Type	EER (measures cooling efficiency)	COP (measures heating efficiency)	
		Closed loop	14.1	3.3	
		Open loop	16.2	3.6	
		Direct expansion	15.0	3.5	
	Ceiling fans	Fan Speed	Minimum airflow	Efficiency Req't	
		Low	1,250 cfm	155 cfm/watt	
		Medium	3,000 cfm	100 cfm/watt	
		High	5,000 cfm	75 cfm/watt	
	Ventilation fans (range hoods, bathroom and utility room fans and in-line ventilating fans)	Fans must meet or exceed requirements for air movement on a per watt basis and permitted noise levels for varying fan capacities (measured in terms of airflow). In addition, if the fan includes a light, the light must not exceed 50 watts, and if it includes a nightlight, the must not consume more than 4 watts. A minimum warranty of one year is also required.			
	Windows and sliding doors	Must meet energy standards expressed in terms of U values or ER values for different climates. U values indicate the extent heat transfer, except for solar gains and airtightness. ER values include heat transfer due to solar gains and airtightness. Climatic regions have been defined in four zones. Current minimum requirements are specified below.			
		Zone	U Value	ER Value (openable)	ER Value (non-openable)
		A	2.00 to 1.88	-16 to -14	-6 to -4
		B	1.87 to 1.71	-13 to -11	-3 to -1
		C	1.70 to 1.41	-10 to -6	0 to 4
		D	1.4 or lower	-5 or higher	5 or higher
		In addition, a window or sliding glass door must have an A2 airtightness rating under the CSA A440 Standard. Note: These requirements will increase in April 2005.			
Quality Assurance Measures	<p>Measures for New Homes in the US</p> <p>The performance of new homes is independently verified relative to the required energy performance standards using one of three optional procedures:</p> <ul style="list-style-type: none"> - Use of the Home Energy Rating System (HERS) by an independent third party such as an accredited home energy rater. - Use of a Builder Option Package (BOP) - Adherence to the quality control procedures established for HUD-code manufactured homes. <p>The HERS rating is an evaluation of the energy efficiency of the home compared to the energy efficiency of a computer simulated reference house identical in size and shape to the rated house that meets the requirements of the Model Energy Code. The reference house score is 80. Each 5% reduction in Energy consumption achieved by the rated house increases the score by 1 point. A new home must achieve a rating of 86 to receive an Energy Star label and certificate. HERS involves an analysis of a home's construction plans and at least one on-site inspection of the house. The construction plan review allows the home energy rater to document physical characteristics and technical information about the house</p>				

	<p>(e.g., orientation, shading, proposed SEER rating, insulation levels, etc. The on-site inspection allows a blower door test to test for air leakiness of the house and a duct test to test the leakiness of the ducts. Results of these tests, along with information derived from the plan review, are entered into the computer simulation program that generates a score and the home's estimated annual energy costs.</p> <p>BOPs are a set of construction specifications for specific climate zones. They establish performance levels for the thermal envelope, insulation, windows, orientation, HVAC systems and water heating efficiency for the relevant climate zone (one of 19). This approach also requires a test of the air leakage of the house and duct leakage.</p> <p>Requirements also exist for manufactured and modular housing to obtain Energy Star labels. These requirements govern procedures and standards for plants to be approved to produce Energy Star houses and to maintain their status that involve quality control procedures.</p> <p>Measures for Qualifying Products in Canada Products are certified by independent accreted agencies.</p>
Builder Qualifying Requirements	This is not applicable to the Energy Star Program as it is applied in Canada.
Summary of Conditions / Implications of Program Label	<p>In the US, the Energy Star label is applied to buildings and products that meet the Energy efficiency standards set by the EPA and DOE.</p> <p>In Canada, product standards are generally the same as those set by the EPA but they may be modified by NRCAN to reflect distinct requirements, and, in cases where the EPA has no standards, NRCAN will develop product.</p>

SUMMARY OF THE POWER SMART PROGRAM IN BRITISH COLUMBIA

Note to reader: Power Smart is a broad initiative by BC Hydro that applies to the residential, commercial, institutional and industrial sectors. Since the prime readership target is new home builders and also renovators, this summary is limited to those parts of Power Smart that focus on the residential sector, and those components of the Program that deal with new homes and home renovation are discussed in most detail.

PROGRAM FEATURES	DETAILS
Objective	To save electrical energy in existing and new housing through encouraging the adoption of cost-effective energy efficient measures.
Status	Power Smart was introduced (in BC) in 1989.
Scope	<p>The residential part of Power Smart offers a number of distinct programs that can be described in the following categories:</p> <p>New Homes Program: Rebates are available for specified types of lighting, heating, appliances, windows and ventilation. Rebates supporting R-2000 houses are also available. The rebates vary by housing form, i.e., one set applies to detached houses, duplexes and townhouses, and another applies to new apartments/condominiums. Details of the rebates are presented in the section, Technical Requirements and Features, below.</p> <p>Renovation Rebate Program: This program offers customers with electric heat information about heat loss and rebates for specific actions to reduce heat loss in their existing homes. This program has two categories: 1) houses and townhouses and 2) multi-family developments, i.e., apartments/condos. Details of the rebates are provided in the section, Technical Requirements and Features, below.</p> <p>General Consumer Programs:</p> <ul style="list-style-type: none"> - Fridge Buy-Back Program: BC Hydro will pick up and recycle up to two old second fridges and pay the donor \$30 per fridge if it is in working order and between 10 and 24 cubic feet in size. - Light Bulb Give-away Program: BC Hydro will give up to two compact fluorescent light bulbs (CFLs) to each eligible household in BC. To be eligible, households must be 1) customers of BC Hydro and 2) not have participated in this Program before. <p>Information Programs:</p> <ul style="list-style-type: none"> - Analyze My Home Program: This component provides guidelines/information to residents on 1) obtaining an estimate of annual energy consumption by end use, 2) the costs of operating major appliances, 3) heating operating costs, 4) saving energy in a person's home. - Appliance Calculator Program: This component provides guidelines on energy used by appliances or systems. - Power Smart Tips Program: This component provides guidelines on how a resident can save energy and improve comfort in their home. - Energy Library: This component contains reference information on home energy savings. - Shop Power Smart Program: This component provides guidelines on energy efficiency products and appliances. In particular, it provides information on the EnerGuide label and the Energy Star mark on appliances.
Program Sponsorship and Support	<p>BC Hydro is the sole sponsor and supporter of this program. It offers the following marketing support to <u>new home builders</u>:</p> <ul style="list-style-type: none"> - Advertising: In order to motivate homebuyers to look for developments that have Power Smart Packages, BC Hydro is advertising extensively across the province encouraging buyers to look for developments that have these Power Smart packages. - Signage: BC Hydro will provide interior and exterior signage for builders' show homes. These signs will help identify those developments that use Power Smart packages and direct homebuyers to the energy-efficient products builders have used such as 1) CFLs 2) appliances, 3) bathroom fans, programmable thermostats, windows with low-e coating and variable speed furnace motors.
"House as a System" Considerations	<p>The "house as a system" concept is not discussed explicitly in the program description but it underlies some of the comments in the Energy Library. One example is responses to questions in the Common Questions section on airtightness of housing. The response discusses potential the negative consequences of lack of controlled ventilation in an airtight house, e.g., moisture build-up, mould, odours, bacteria, combustion spillage and other pollutants.</p>

<p>Technical Requirements and Features</p>	<p>Rebates provided under the New Home Program for Energy-Related Construction Homebuilders who participate in the rebate program receive a rebate for every Power Smart package of energy-efficient products they install.</p> <ul style="list-style-type: none"> - Power Smart Lighting Package: <ul style="list-style-type: none"> - Rebates applicable to detached houses/duplexes (semi-detached houses)/townhouses with gas as the main source of heating, or with electric space heating (via various means) built in an area where gas is not an option: \$50 for installing at least two fluorescent tubes in a garage and a minimum of 5 Energy Star® labelled CFLs indoors or outdoors of each unit. In addition, a \$5 rebate is provided for each CFL unit in each unit to a maximum of \$100 per unit. - Rebates applicable to apartments/condominiums: \$20 for installing two Energy Star® labelled CFLs plus \$5 for each additional CFL to a maximum of \$20 per unit. - Power Smart Heating Package: Rebates of \$150 for installing a furnace with a variable speed motor and a programmable thermostat in new houses, duplexes, and townhouses. - Power Smart Appliance Package: Rebates vary by building form, type of heating system and the number and types of appliances installed, as follows: <ul style="list-style-type: none"> - Rebates applicable to new detached houses, duplexes and townhouses with gas as the main source of heating: \$50 for installing any two of the following Energy Star® labelled appliances: refrigerators, clothes washers or dishwashers. - Rebates applicable to new detached houses, duplexes and townhouses with electric hot water heaters and electric space heating (via various means) built in an area where gas is not an option: \$200 for installing all three of the following Energy Star® labelled appliances: refrigerators, clothes washers or dishwashers. - Rebates applicable to new apartments/condominiums: \$50 for installing any two of the following Energy Star® labelled appliances: refrigerators, clothes washers or dishwashers. - Power Smart Window Package: Rebates applicable to new detached houses, duplexes and townhouses with space heating built in an area where natural gas is/was not a heating option: \$1.00 per square foot of windows installed with low-e coating, or \$1.25 per square foot of windows installed with both argon and low-e coating. - Power Smart Ventilation Package: Rebates applicable to detached houses / duplexes / townhouses with gas as the main source of heating, or with electric hot water heaters and electric space heating (via various means): \$25 for each Energy Star® labelled bathroom fan connected to a timer or dehumidistat to a maximum of three fans or \$75. - Power Smart R-2000 Package: <ul style="list-style-type: none"> - Rebates applicable to certified and registered duplexes/townhouses with electric space heating (via various means) built in an area where gas is not an option: \$500 for providing BC Hydro with a copy of the certificate. - Rebates applicable to certified and registered detached houses with electric space heating (via various means) built in an area where gas is not an option: \$1,000 for providing BC Hydro with a copy of the certificate. <p>Rebates Provided under the Renovation Rebate Program The following eligibility conditions apply for <u>houses and townhouses</u>:</p> <ul style="list-style-type: none"> - Households must be customers of BC Hydro. - Residences must have hard-wired electric heat as their main source of heating. - Energy consumption must exceed 15,000 kWh. - Time limits apply. <p>The following renovations are eligible for rebates in the amounts specified:</p> <ul style="list-style-type: none"> - Window rebate: \$1.00 per square foot of window area installed with low-e, and \$1.25 per square foot of window area installed with low-e and argon fill. - Crawlspace insulation rebate: \$.20 for every square foot of R12 insulation installed on crawl space walls, or for every square foot of R28 insulation installed on the floor above a crawl space. - Basement insulation rebate: \$.20 for every square foot of R12 insulation installed in basement walls. - Attic insulation rebate: \$.15 per square foot of insulation installed in an open attic to equal a total of R40 value; or \$.10 per square foot of insulation installed in flat or vaulted ceilings to a total of R28. - EnerGuide for Housing (EGH) rebates: \$50 for copies of both pre-and post EGH reports. <p>The following rebates are available for <u>apartments and condos</u> (conditions of eligibility are similar to those for houses and townhouses, plus exclusion of units with gas fireplaces).</p> <ul style="list-style-type: none"> - Window rebate: \$.75 per square foot of window area installed with low-e, and \$1.00 per square foot of window area installed with low-e and argon fill.
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Quality Assurance Measures	In the case of the new home rebate program, BC Hydro carries out audits on sample of homes in the program. In the case of the renovation rebate program, applicants must sign statements agreeing to allow BC Hydro to verify the work done and to provide original copies of receipts about product purchase. BC Hydro carries out audits on a sample of projects.
Builder Qualifying Requirements	No applicable.
Summary of / Implications of Program Label	Not applicable.

SUMMARY OF THE POWER SMART RESIDENTIAL PROGRAMS IN MANITOBA

Note to reader: Power Smart is a broad energy conservation initiative by Manitoba Hydro that applies to the residential, commercial, institutional and industrial sectors. Since the main readers of the summaries of energy efficient housing programs, of which this summary is a part, are new home builders and also renovators, this summary focuses on those parts of Power Smart that focus on the residential sector, and those components of the Program that deal with new homes and home renovation are discussed in most detail.

PROGRAM FEATURES	DETAILS
Objective	The overall objective of the Power Smart Program in Manitoba is to meet the energy needs of the Province through efficiency improvements rather than through new sources of generation. The objective of the Power Smart's New Home Program is to promote and encourage energy efficiency in newly constructed homes.
Status	The Power Smart Program was launched in 1991. The Power Smart New Home Program was launched on February 25, 2004
Scope	<p>The residential component of the Power Smart Program offers a number of information (technical advice), incentive and financing programs that are summarized below:</p> <p>Power Smart New Home Program: This is an incentive program targeted at new homes. It is described in detail below in relevant categories.</p> <p>Home Comfort Energy Savings Program: This program has two components:</p> <ul style="list-style-type: none"> - <u>Power Smart Residential Loan:</u> This is a financing program targeted at existing houses. It is described in detail below in relevant categories. - <u>Information and Home Energy Assessment Services:</u> These services include the Home Comfort Information Initiative and three home assessment options: a Power Smart EnerGuide In-Home Energy Assessment, an On-line Energy Assessment and a Mail-in Energy Assessment, and are described in detail below. <p>Residential Earth Power Program: Manitoba Hydro offers an Earth Power Loan of up to \$15,000 for the purchase of a geothermal heat pump at an interest rate of 6.5% payable on a homeowner's utility bill.</p> <p>Power Smart Home Insulation Program for Electrically Heated homes: This is an incentive program targeted at existing electrically heating homes. Financial incentives are typically between 75%-100% of the material cost of the insulation added to walls, attics and basements of homes.</p> <p>Consumer Information Guides and Resources</p> <ul style="list-style-type: none"> - <u>Power Smart LED Seasonal Lighting:</u> This component of the Power Smart initiative provides information to promote the use of light emitting diode (LED) lights. - <u>WISE Home Program for Seniors</u> (WISE is an acronym for Wisdom in Saving Energy). This program is available to seniors who are 55 years or older, homeowners and Manitoba Hydro customers and has the following components: <ul style="list-style-type: none"> - <u>Energy Check-Up:</u> Trained university students carry out an energy check of qualifying seniors' homes from May to August 2004 in Winnipeg and the surrounding area. The check includes the following items: 1) verifying information about the furnace, hot water tank, windows and thermostat, 2) installing some energy saving devices, 3) collecting information about the energy use in the home and 4) helping owners complete a Manitoba Hydro home energy questionnaire. - <u>Report:</u> Manitoba Hydro analyzes the information and sends a report to the homeowner containing suggestions on how to save energy within the home and a retrofit strategy, including cost estimates and estimated savings. - <u>Home Energy Calculator:</u> This is a program that helps homeowners calculate the amount of electric and natural gas energy used by their household with alternate kitchen, laundry, heating and cooling, outdoor and garage appliances. - <u>Appliance Operating Cost Comparisons:</u> This to be an information guide on the average cost of appliance operations, and tips on how to save energy in appliance use. - <u>Home Heating Cost Comparisons:</u> This is an information guide on space and domestic water heating costs, and information on implications of converting from existing to other systems for these functions.

Program Sponsorship and Support	Manitoba Hydro is the sponsor of the Power Smart Program in Manitoba. In addition to the programs referred to above, Manitoba Hydro also actively promotes the New Home Program and is developing marketing materials and an advertising campaign to complement it. These will be available to builders who wish to participate.
“House As A System” Considerations	The “house as a system” concept is not discussed explicitly in the program description but it underlies comments in some of the sections that provide technical advice. For example, comments on replacing a natural gas heating system include comments on the potential implications of this action on the house’s ventilation system. Comments on typical home and water heating costs include similar statements, e.g., that eliminating a chimney due to changing a heating system may require a change to the ventilation system to control humidity. In addition, those parts of the New Homes Program and the Home Comfort Energy Savings Program that utilize the EnerGuide for Houses Program incorporate the “house as a system” concepts of that Program. These concepts are summarized in the description of the EnerGuide for Houses Program.
Technical Requirements and Features	<p>Power Smart New Home Program</p> <p><u>Overview:</u> Manitoba Hydro makes available to its customers an incentive of \$1,000 toward the purchase of an Energy Star front loading washing machine or a \$600 rebate on their electric bill <u>if</u> they include specified prescriptive measures in their new homes and meet requirements of the EnerGuide for Houses Program (see description of the EnerGuide For Houses Program for a summary of requirements). These prescriptive measures are referred to as the Power Smart New Home Upgrade and are summarized below:</p> <p><u>Prescribed Minimum Technical Standards</u></p> <p>The technical standards vary slightly by the heating source for the house and pertain to energy and water conservation.</p> <ul style="list-style-type: none"> - Attic insulation: R-50 with a 12” high-heeled roof truss. - Exterior walls: Insulation standards vary by mode of heating. In electrically heated houses, the walls must have R20 insulation (in 2x6 walls) plus 1.5 inches of rigid insulation. Natural gas heated houses must have R20 insulation (in 2x6 walls). - Airtightness: Must not exceed 1.5 AC/H @ 50 P. - Hot water tank insulation: Wrapped in a minimum of 2” of polyurethane insulation. - Permanently wired car plug timer. - Power Smart lighting (florescent or compact florescent) in kitchen, living room and one other main area. - Heat recovery ventilator (HRV) system that meets the entry level VENMAR Constructo 1.5 or equivalent. - Heating system requirements vary with the mode of space heating: A natural gas-heated house must incorporate a high efficiency condensing gas furnace and, if a gas fireplace is used, it must be supplied with electronic ignition. - Low flow shower heads (9.5 l/min) and faucet aerators. - EnerGuide requirements: Each house plan built under the Program must be analyzed under the EnerGuide for New Houses Program. Each completed house will be inspected by Manitoba Hydro to ensure compliance with the above standards. The inspection will include an airtightness test (blower door test) meeting Power Smart standards. (Manitoba Hydro is the licensed EnerGuide for Houses delivery agent in Manitoba.) As of 2004, Manitoba Hydro is training builders to perform a plan analysis in-house. However, Manitoba Hydro will complete the EnerGuide for New Houses plan analysis for new houses at no charge for the first year of the Power Smart New Home Program. The charge after that will be \$75. <p>If these requirements are met, the new homes can be certified Power Smart.</p>
Technical Requirements and Features	<p>Home Comfort Energy Savings Program: Residential Loan Program</p> <p><u>Overview:</u> This is a financing program targeted at existing homes. It offers a loan - the Power Smart Residential Loan - -of not less than \$500 and not more than \$5,000, which is available to pay for specified energy saving measures discussed below. The loan can be repaid in a period up to five years. The loan interest is fixed at 6.5%. To be eligible for the loan, an applicant must be a Manitoba Hydro customer and the owner of the home where the improvements will occur. The upgrades must meet Manitoba Hydro Power Smart standards for each of the eligible items. The Program also offers a number of information and home energy assessment services to help homeowners make decisions about participation in the Program (see Information and Home Energy Assessment Services below).</p>

Prescribed Minimum Technical Requirements

- Insulation standards:
 - Attic: minimum of RSI 8.8/R-50
 - Basement walls: minimum of RSI 4.2/R-24 (basement exterior perimeter skirt: minimum of RSI 2.1/R-12.5 when using combination interior/exterior insulation on basement)
 - Crawlspace: minimum of RSI 4.2/R24 (RSI 2.1/R-12 exterior insulation and same interior insulation).
 - Re-siding: Minimum of RSI 1.8/R-10 in uninsulated wall cavities and minimum of RSI 0.7/R-3.75 exterior wall insulation (residing materials qualify for the loan when installed in conjunction with the minimum exterior wall insulation.
 - Uninsulated wall cavities to a minimum of RSI 1.8/R-10.
 - Related building materials are also available for financing when the work is done in conjunction with adding insulation, including vapour barrier materials that conform to CGSB standards, framing and fire-protective (but not decorative) covering where required, e.g., gypsum board or stucco, electrical wiring and outlets that meet electrical code standards for basement walls.
- Air sealing:
 - Caulks and sealants that meet specified standards and performance requirements
 - Sealant foam materials that meet specified standards and composition
 - Weather stripping for windows, doorsills, doorjambs and headers meeting specifications.
 - Approved electrical outlet seals for light switches and electrical outlets
 - Replacement floor drain covers that allow water to drain when required but do not allow air or soil gas to enter the home.
- Windows: Homeowners can choose to comply with prescriptive or performance standards.
 - Prescriptive standards: Windows installed south of the 53 parallel must meet the following standards: double glazed, insulated spacer, low-e coating, argon fill, vinyl or fibreglass frame or triple glazed, insulated spacer, low-e coating, vinyl or fibreglass frame. Windows installed north of the 53 parallel must be triple glazed, insulated spacer, low-e coating, argon-filled, vinyl or fibreglass frame. Also, insulated glass units must meet specified standards.
 - Performance standards: Windows must meet specified standards for air infiltration, water infiltration and wind resistance, and specified energy ratings by location. Insulated glass units must meet specified standards. Also, skylights and adhesive coatings and roll shutters are not allowed.
- Doors: Must meet specified standards and have an overall RSI value of 0.88/R-5.
- Ventilation: The requirements only apply if ventilation equipment is installed.
 - Unitary fans must meet specified standards. Fans with incandescent lighting kits are not allowed.
 - HRVs must be sized and installed according to specified standards.
- Water heaters: Electric and natural gas water heaters: Replaced heaters must meet specified standards. Replaced existing electric water heater should be replaced with approved Power Smart Gold electric water heaters (C191.1-M90 less 32 percent). If installing a high efficiency furnace/boiler requires a change of the water heater to comply with codes, then the existing natural gas water heater should be replaced with a CSA approved natural gas sidewall vented water heater.
- Electric space heating: The following components are eligible: heating and associated components: wiring, ductwork, valves, pumps and motors. Electronic air cleaners must be permanently connected to the wiring system. Humidifiers must be permanently installed. Heat pump systems must be sized in accordance with specified standards.
- Natural gas heating systems: Replace existing natural gas furnace/boiler with CSA approved high-efficiency condensing natural gas furnace/boiler. Electronic air cleaners must be permanently connected to the electrical system of the home. Use of any plug-in type of power adapter is not allowed. Replaced systems must comply with specified standards and sized in accordance with good industry practice.
- Electrical service and wiring upgrades are eligible if they are sized in accordance with and meet the requirements of the Manitoba Electrical Code.
- Interior and exterior lighting fixtures are eligible where they are made in conjunction with other electrical and energy improvement work.

<p>Technical Requirements and Features</p>	<p>Information and Home Energy Assessment Services</p> <ul style="list-style-type: none"> - <u>Home Comfort Information Initiative</u>: This is an information service that responds to requests by telephone or e-mail. A related service is the Home Energy Calculator, an on-line check sheet that allows homeowners to assess previous energy saving projects undertaken and helps them decide on other measures. - <u>Home assessment options</u>: This component has three options: <ul style="list-style-type: none"> - Power Smart EnerGuide In-Home Energy Assessment: A Manitoba Energy Advisor conducts an energy assessment, as part of the federal government's EnerGuide for Houses Program at a current cost of \$75 + GST (Manitoba Hydro is the licensed EnerGuide for Houses delivery agent in Manitoba). This assessment is required to be eligible for the EnerGuide for Houses Energy Efficiency Grant. - On-line Energy Assessment: Households input their energy data, e-mail it to Manitoba Hydro and Manitoba Hydro sends an energy efficiency report to the household. The report will show 1) a breakdown of the home's energy use, 2) tips on how to make the home more energy efficient and comfortable, 3) how to save money on the energy bill. This service is free, but the EnerGuide for Houses Energy Efficiency Retrofit Grant is not available under this arrangement. This assessment applies to residential buildings other than the following: cottages, apartments that do not have their own electrical service meter, or duplex buildings service by only one electrical service. - Mail-in Energy Assessment: Households complete energy assessment forms and mail them to Manitoba Hydro, which provides an energy efficiency report on the house. This service costs \$19.99 + GST. The EnerGuide for Houses Energy Efficiency Retrofit Grant is not available under this arrangement.
<p>Quality Assurance Measures</p>	<p>Those parts of the New Homes Program and the Home Comfort Energy Savings Program that utilize the EnerGuide for Houses Program incorporate the quality assurance measures of that Program. These are summarized in the description of the EnerGuide for Houses Program.</p>
<p>Builder Qualifying Requirements</p>	<p>Eligibility: Any builder may register a home prior to construction in the New Home Program.</p> <p>Costs:</p> <ul style="list-style-type: none"> - <u>New Home Program</u> <ul style="list-style-type: none"> - In the first year of the Program, there is no cost of enrolment. After the first year, the enrolment cost is \$75. - In the first year of the Program, there is no cost for a plan evaluation. After the first year, the plan evaluation cost per design is \$75 if Manitoba Hydro does it. - <u>Home Assessment Services</u> <ul style="list-style-type: none"> - The cost of the Power Smart EnerGuide In-Home Energy Assessment is currently \$75 + GST. (There is no cost to a follow-up EnerGuide assessment after renovations have been completed.) - There is no cost for the On-line Energy Assessment (The EnerGuide for Houses Energy Efficiency Retrofit Grant is not available under this arrangement.) - The cost of the Mail-in Energy Assessment is \$19.99 + GST (The EnerGuide for Houses Energy Efficiency Retrofit Grant is not available under this arrangement.)
<p>Summary of Conditions for / Implications of Program Label</p>	<p><u>New Home Program</u></p> <p>Once a home has met all of the technical requirements for the Power Smart New Home Program, the homeowner will receive the incentive, an EnerGuide for New Houses rating and a Power Smart certification.</p>

**PART 2: SUMMARIES OF OTHER ENERGY EFFICIENT HOUSING
PROGRAMS/INITIATIVES**

SUMMARY OF THE “BUILDING CANADA” PROGRAM

Overview and Objective

“Building Canada” is a new tool that provides advice to large-volume builders on improving their house designs, construction practices and business practices to achieve improvements in the housing product they produce, particularly in terms of energy efficiency, at no or little additional cost. The improvements are achieved by focusing on remedying construction defects and identifying cost-saving measures that can be incorporated within the builder’s business.

Background and Current Status

The Building Canada initiative is modeled on the Building America Program.

The Building America Program was launched in the USA in the mid 1990s. Its objectives are 1) to design and construct more energy efficient homes, 2) to reduce construction costs (in order to provide more affordable housing), 3) to improve comfort in housing, 4) to improve health and safety and indoor air quality, 5) to increase resource use efficiency and 6) to increase building durability. Its strategy is based on a systems approach in which all elements of a house are viewed as a series of inter-related components. This strategy brings together the main players involved in house building (designers, builders, financial institutions, materials suppliers and equipment manufacturers, etc.), who traditionally work independently, to re-engineer the house on the basis of Program objectives. It allows decisions to be made with an awareness of their implications on the entire design, manufacturing and construction process. The Program involves large-volume, production builders.

This approach has been successful with many builders in the USA. Cost savings have resulted in reduced warranty claims and call backs, and these savings have then been applied to improve building performance, particularly energy efficiency improvements.

In Canada in 2000, various groups and individuals began to explore the idea of implementing the same type of initiative. In the same year, EnerQuality Corporation developed an outline for a Building Canada program based on ideas similar to those in the Building America Program, and worked toward implementing a pilot of the Program (EnerQuality Corporation is responsible for the delivery of the R-2000 Standard and the EnerGuide for New Houses Program, and for the development of other complementary initiatives in Ontario).

In 2003, NRCan made an arrangement with EnerQuality Corp. to establish Building Canada teams throughout Canada. To date, teams have been established in central Canada (in Ontario), Atlantic Canada and western Canada (in Alberta). The central Canada team is managed by EnerQuality, the Atlantic Canada team is managed by the Nova Scotia Home Builders’ Association and the western Canada team managed by Enervision.

Approach Used in Building Canada

Many of the objectives, principles and strategies of the Building Canada tool are similar to those of the Building America Program except that Building Canada is not a certification process but simply a tool. Some of the important operating elements of Building Canada are outlined below:

- The objective is to achieve more energy efficient housing at little or no additional cost.
- The focus of the program is on large-volume production builders for the following reasons:
 - The potential achievements in producing more energy efficient housing are greater because of these builders' productive capacities.
 - The opportunities for savings through a systems approach (and their consequent re-allocation to improvements in energy efficient housing construction) are greater with large-volume builders (the integration of house building operations is easier for small builders).
- The process for identifying and selecting builders to participate in the Program include a company's willingness to consider changes to their operations and their willingness to re-invest savings achieved from the examination and re-engineering of its house plans into energy upgrades.
- A systems approach is used, not just in focusing on innovative technologies but also on business operations. As in the Building America Program, this involves a team with expertise on all segments of house building working with all of the key players of the participating builder's team.
- The main steps of the process include 1) re-engineering the plans of participating builders, 2) building a house to try the new technologies and practices, 3) testing the house to ascertain savings achieved, and 4) reviewing and refining the techniques. The participating builder is expected to implement the new techniques in its future production.
- Participating builders are required to label their product using the EnerGuide for New Houses tool.
- Training in plan evaluation is made available to participating builders and the Building Canada Team is made available to participating builders and their trades.

SUMMARY OF GREEN GLOBES

Overview

Green Globes is an online building design and management energy and environmental audit that helps property owners, managers and building designers measure the environmental performance of the buildings against best practices in areas such as environmental management, site, energy, water, use of resources, waste, pollution reduction and indoor environment.

Green Globes is based on confidential questionnaires, which consist largely of “yes” “no” types of questions. Once the questionnaires are completed, the program generates comprehensive on-line assessment and guidance reports. The reports provide 1) an overall building rating; 2) eco-ratings for energy use, water use, resource use, the indoor environment and environmental management issues, 3) information on potential savings for energy and water, 4) highlights of the building’s achievements, 5) suggestions for improving the building and 6) links to information on building systems and management.

Green Globes was developed in Canada by ECD Energy and Environment Canada Ltd. (ECD) in response to the need in the marketplace for an inexpensive method of environmental assessment that could be initially conducted in-house and later certified.

Scope

Green Globes applies to commercial, institutional and multi-residential high-rise buildings. There are two versions: Green Globes for Existing Buildings and Green Globes Design.

Green Globes for Existing Buildings assesses the building fabric and systems as well as energy and environmental aspects of building management and operations. Part of the reporting of result includes information on greenhouse gas (GHG) emissions. This enables the building owner/manager to begin the process of developing a GHG Action Plan. The assessment has been particularly useful to identify issues that may require attention, prepare action plans and educate the management and operation staff on ways to deal with the identified issues. The assessment has also been used in the asset management of entire portfolios of buildings or in preparation of energy management plans for an energy retrofit.

Green Globes Design is both a guide for integrating green design principles and an assessment protocol. It provides a mean for implementing the integrated design process in which all the team members work together to set sustainability goals, consider variety of design options, and develop an optimal design. It does so by providing a structured, step process for each stage of project delivery.

Three versions of Green Globes Design for the design of new buildings have been developed: one for Public Works and Government Services Canada (PWGSC), one for the Department of National Defence (DND) and one for general practitioners and consultants such as developers, architects and landscape architects, mechanical, electrical, structural engineers and other development and building industry consultants. The assessment occurs at two stages, which broadly correspond to the planning approvals stage: a preliminary rating at the design concept stage (which corresponds to the planning approvals stage and provides an opportunity to improve the design), and a final rating at the construction document stage (which corresponds to the issue of building permit). Using Green Globes questionnaires for each stage of project delivery helps to design a building that will be energy and resource efficient, will achieve operational savings and be healthier to work or live in.

Green Globes is available in Canada and the UK and the USA. Following the successful application of Green Globes by BOMA Toronto to prepare and evaluate submissions for the Earth Award, BOMA Canada is adopting Green Globes to be the backbone of its national BOMA Canada Energy & Environmental Performance and Recognition Program for Commercial Buildings.

In the UK, a British version of the Green Globes, called GEM, is supported by the Royal Institute of Chartered Surveyors (RICS) Foundation and Faber Maunsell, a member of the AECOM Technology Corporation, and was launched at the World Summit in Johannesburg in 2002.

In the USA Green Globes is being launched by Green Building Initiative, a not-for-profit organization and education initiative supported by a broad cross section of industry associations, government organizations, companies and NGOs interested in the sustainable residential and commercial construction.

Most recently ECD has also developed additional modules, i.e., a historic building module, a light Industrial buildings module and a “fit-up” module (for commercial interiors).

Users

The Government of Canada “Sustainable Development in Government Operations: Guideline for the Use of Building Environmental Performance Assessment Tools” recommends use of PWGSC/DND Green Globes environmental integration framework for support to new construction and major renovation projects in the following situations:

- For projects valued over \$1 million.
- When major occupancy is office or multi-unit residential (including military quarters/ barracks).
- To support project planning, definition and implementation phases.
- As a valuable way to guide the design process.
- For consultant monitoring and compliance review.
- In a systematic integrated approach consistent with ISO 14001.

They also recommend using the PWGSC/DND Green Globes for environmental performance assessment of existing buildings to perform post occupancy evaluations and identify future renovation projects that will have the most positive impact on the environment.

Green Globes for existing buildings is also used by federal departments to evaluate and benchmark energy and environmental performance of their building stock. It assists them to meet their sustainability goals for their real estate portfolio – the work which began with the “Progress Towards Sustainable Development”, a protocol used to assess the energy and environmental performance of all federally owned government buildings under the Alternative Form of Delivery process.

Green Globes has also been used by the Public Works Nunavut for its Energy Management and buildings retrofit program and it is also used by major property management firms, such as GWL Realty which is applying it to manage the environmental performance of its entire portfolio.

Technical Requirements and Features

Scope of Assessment

The assessment applies to seven categories or modules. Some examples for each category are outlined below but the scope of the assessment is broader and varies depending on whether the assessment is for existing buildings or buildings at the design stage.

- **Project management:** Evaluates items such as use of the Integrated Design Process, EMS, environmental purchasing, building commissioning and emergency response.
- **Site:** Evaluates items such as site selection, density, remediation and reduced site disturbance.
- **Energy:** Evaluates energy performance, features that help to reduce energy use and demand, energy management and use of renewable energy.
- **Water:** Evaluates items such as conservation strategies and reduction of off-site treatment of water.
- **Resources:** Evaluates items such as application of life cycle assessment (LCA), use of non-renewable resources, reuse of existing buildings, building durability, adaptability and disassembly, recycling facilities and demolition waste.
- **Emissions/Pollution Reduction:** Evaluates items such as emissions, avoidance of ozone-depleting refrigerants, effluents, prevention of surface run-off and pollution reduction strategies.
- **Indoor environment:** Evaluates items such as ventilation, filtration, humidification, source control of pollutants, IAQ management, and thermal comfort and acoustics (noise control).

Ratings

The Program provides an overall green building rating (1 Green Globe to 5 Green Globes) as well as scores that give the percentage of possible points that have been awarded for implementing industry best practices for each module.

Relation to LEED Standards

In 2001, the Government of Canada funded a study to harmonize the criteria with LEED. As a result of this study, approximately 90% of criteria were harmonized with LEED and scores were harmonized to within 85% of LEED standards.

Third Party Verification and Certification

Third party verification of assessments is an option. Those who allow third party verification are entitled to display a Green Globes certificate.

SUMMARY OF THE ENVIRONMENTAL CHOICE PROGRAM

Overview

The Environmental Choice Program^M (ECP) is a Canadian eco-labelling program. Products and services that comply with ECP certification criteria can be labelled with the EcoLogo^M symbol. The EcoLogo^M symbol features three stylized doves intertwined in the form of a maple leaf representing consumers, industry and government working together to improve Canada's environment. The objective of the Program is to provide a market incentive to manufacturers and suppliers to encourage the supply of products and services that are more environmentally responsible and to help organizations and consumers buy "green".

The ECP was established by Environment Canada in 1988. Since 1995, the Program has been managed and delivered by TerraChoice Environmental Marketing, an environmental program and consulting services firm.

Scope

The Program provides listings for a broad range of products and services that have been certified under the program. They are listed in the following categories:

1. Appliances	8. Marine products
2. Automotive products and lubricants	9. Mutual funds
3. Building, grounds and construction	10. Office products
4. Cleaning products	11. Paints and surface coatings
5. Electricity	12. Paper products and printing services
6. Equipment, machinery and automotive products	13. Plastic products and plastic film
7. Hotel accommodation	14. Systems and technologies

One category that impacts housing is "building, grounds and construction". It contains 25 sub-categories of products, including (for example) carpeting, gypsum wallboard, shingles and thermal insulation. A search of the site identifies products and services that have been certified under the Program.

Technical Requirements

A key aspect of the certification process is the requirement for third party verification of compliance with ECP certification criteria as a condition for certification and licensing. This process ensures the Program's credibility and includes the following processes:

- A review of each applicant company's product and process information,
- An examination of the company's quality assurance and quality control measures, and
- Where deemed necessary by ECP officials, an audit of the company's facilities for purposes of initial certification.

Each category of product/service must meet criteria that are pertinent to the category. For example, the certification criteria in the "building, grounds and construction" category include 1) aggressive rates of recycled content, 2) reductions in a variety of undesirable chemicals, and 3) the promotion of products that conserve resources.

SUMMARY OF HEALTHY HOUSING CONCEPT

Overview

Canada Mortgage and Housing Corporation (CMHC) has developed and promotes the concept of healthy housing. A healthy house is described as one that good for people who live in it, good for the community and good for the environment. CMHC has developed some projects that demonstrate the healthy housing concept and provides extensive information on healthy building methods, materials, and sustainable practices that make housing healthier.

Healthy housing is a housing concept, and not a housing rating system or housing program.

The Five Essentials of Healthy Housing

CMHC has identified five key attributes of the healthy housing concept, referred to as the five essentials. They are listed below, along with examples of each of the attributes offered by CMHC:

1. Occupant health: Examples of features that contribute to occupant health are listed below:
 - High efficiency ventilation system to ensure superior indoor air quality
 - Low emission paints to reduce vapours
 - Hardwood and tile floors which are easier to clean
 - Cabinetry and shelving from special products that do not emit formaldehyde and other vapours
 - Storage rooms ventilated to exterior
2. Energy efficiency: Examples of energy efficient features are listed below:
 - High efficiency hot water heating system to reduce fuel consumption
 - Increased insulation levels in walls and attic
 - High efficiency windows and doors
 - Energy efficient appliances
 - Energy efficient lighting like compact fluorescents
 - Generous windows to reduce lighting costs
3. Resource efficiency: Examples of features that reduce resource consumption are listed below:
 - Low flow toilets and plumbing fixtures to conserve water
 - Efficient use of building materials to reduce construction waste
 - Extensive use of recycled building materials
 - Use of rapid growing woods like spruce and maple
 - Locally produced materials to support local economy
4. Environmental responsibility: Examples of features that reduce environmental impact are listed below:
 - Recycling of old building materials
 - Recycling centre in the kitchen
 - Exterior composter
 - Better use of site by increasing occupant density
 - Use of building products that require lower energy to manufacture
 - Home office to reduce vehicle usage

5. Affordability: Examples of features that make housing more affordable are listed below:
- Use of products that are readily available at reasonable cost
 - Flexible design will reduce future renovation costs
 - Low maintenance, long lasting materials and finishes
 - High indoor air quality for better occupant health and lower health care costs
 - Energy efficiency means lower heating and electricity costs

SUMMARY OF HEALTHY HOUSING RECOGNITION PROGRAM

Overview, Objective and Program Sponsor

The Healthy Housing Recognition Program was established by Canada Mortgage and Housing Corporation (CMHC) in the late 1990s to honour builders and renovators who have demonstrated knowledge of healthy housing practices. The Program recognizes builders' and renovators' knowledge and skills rather than a specific housing development.

Scope

Builders and renovators from Ontario who are registered with the Ontario New Home warranty Program are eligible under this Program. While the program is active in Ontario, CMHC is prepared to make it available in other regions of the country.

Technical Requirements

Applicants submitting projects for consideration must indicate those features of healthy housing that are included in the project. Healthy housing features are listed below under in five categories. Projects must include the features below or equivalencies to them. CMHC assesses the project on the basis of its inclusions.

Occupant Health

- Paints and stains with no or low VOCs.
- Water-based adhesives.
- Non-toxic sealants (water based).
- Sub-flooring with low-level emissions, e.g. softwood plywood.
- Hard surface finish flooring (e.g. wood/ceramic) min. 75% of finished floor area.
- Solid wood or formaldehyde free kitchen and bathroom cabinets.
- Effective and efficient ventilation. All heat recovery ventilators (HRVs) and energy recovery ventilators (ERVs) installed in projects submitted for review must be installed, balanced and certified by a licensed Heating, Refrigerating and Air Conditioning Institute (HRAI) technician.
- Efficient furnace filtration (e.g. pleated filter, HEPA, electrostatic).
- Combustion air as required.
- Moisture control (e.g. foundation exterior insulation and drainage layer).

Energy Efficiency

- Building and floor plan oriented for best solar advantage.
- Windows: Low-E, gas filled, warm-edge spacer bars, insulated frames.
- High efficiency space heating (AFUE of 89% or greater).
- Low energy use lighting (e.g. low voltage lights, task lighting, compact florescent).
- Air seal around windows, doors, outlets and fixtures at wall/ceiling areas.
- Shading for south/west windows: overhangs, awnings, landscaping (deciduous trees).
- Insulated hot water pipes to prevent heat loss and to save water.

Resource Efficiency

- Rainwater collection system for plant aeration, lawn watering, e.g. rain barrels.
- Temperature pressure balance bath/shower valves.
- Setback thermostat for furnace operation.

Environmental Responsibility

- Minimize flow of waste to local landfills.
- Evidence of recycled products (e.g. floor trusses, engineered wood).
- Rain water collection (e.g. rain barrels).

Affordability

- Efficient use of floor space.
- Enhanced energy/water efficiency (higher insulation values, energy efficient lighting, site orientation, ultra flush toilets, water-saving aerators/shower heads and rain barrels) will allow the occupant to have low operational costs (lower energy and water bills).

SUMMARY OF “CANADA’S ENERGY EFFICIENCY AWARDS”

Overview and Objective

Canada’s Energy Efficiency Awards recognize and honour Canadian innovation and achievement in energy efficiency as part of Canada’s response to the global challenge of climate change. These awards are sponsored by Natural Resources Canada (NRCan) and are awarded annually. The awards are adjudicated by NRCan’s Office of Energy Conservation (OEE) and the National Advisory Council on Energy Efficiency (except the award for the media category which is evaluated by the Canadian Science Writers’ Association). OEE’s mandate is to strengthen and expand Canada’s commitment to energy efficiency. The National Advisory Council on Energy Efficiency is composed of energy efficiency experts and leaders from all sectors of the economy and all regions of the country.

Winners receive a trophy inspired by an original work of art by a Canadian sculptor. Winners have a full year to use the award to promote their businesses or organizations. The OEE works closely with winners to increase awareness of the awards and help winners promote their energy efficiency achievements.

Program Scope, Eligibility Criteria and Evaluation Criteria

Awards under this Program are available in the following categories: equipment and technology, housing, buildings, industry, transportation (on-road), outreach and media. The following comments focus on the housing awards.

Awards are available for low-rise housing as defined under Part 9 of the National Building Code in three categories: 1) new construction, single house, 2) new construction, multiple houses and 3) renovation projects. The eligibility and evaluative criteria for housing in each of these categories and summarized below:

The following three eligibility criteria apply to all housing categories:

- Project cannot previously have won this award.
- The project cannot have a net negative environmental impact.
- The project must be undertaken in Canada.

Specific Eligibility Criteria	Types of Housing		
	New Construction, Single House	New Construction, Multiple Houses	Renovation Projects
Nominee eligibility criteria	Builders, developers, architects, architectural technologists, R-2000 service providers and owners of low-rise residential buildings	Builders, developers, architects, architectural technologists, R-2000 service providers and municipal, provincial or territorial housing organizations that are owners of low-rise residential buildings.	Renovation contractors and municipal, provincial or territorial housing organizations that are owners of low-rise residential buildings
Housing product eligibility criteria	<ul style="list-style-type: none"> - The house must be R-2000 certified or have an EnerGuide for Houses (EGH) rating of 80 or higher. - The house must be destined to be occupied. - The houses must be completed and/or certified by the deadline of the submission of nominations. 	Product: The same criteria that apply in the single house category apply to all houses in the multiple houses category.	<ul style="list-style-type: none"> - The house must have had an EGH evaluation before and after the renovation. - The house must be an occupied residence.

Evaluation Criteria by Types of Housing		
New Construction, Single House	New Construction, Multiple Houses	Renovation Projects
Energy efficiency of the house (predicted).	Energy efficiency of the houses (predicted).	Improvement in EGH rating after renovation.
Potential for the materials, systems and construction approaches to be adopted/replicated by the building industry, and cost-effectiveness of the construction (relative to others on the market in the same location, and excluding the cost of land).	Replication of materials, systems and construction approaches, and cost-effectiveness of the construction (relative to others on the market in the same location, and excluding the cost of land).	Energy-saving work beyond what is typically recommended by EGH; also difficulty in improving energy efficiency.
Innovation and creativity in energy-related systems design	Innovation and creativity in energy-related systems design	Cost effectiveness of the project (measured by dollar cost per EGH point achieved)
Comprehensiveness of the project, i.e., integration of a variety of systems, technologies, practices and other environmental considerations.	Comprehensiveness of the project, i.e., integration of a variety of systems, technologies, practices and other environmental considerations.	Comprehensiveness of the project, i.e., integration of a variety of systems, technologies, practices and other environmental considerations.

SUMMARY OF AWARD FOR OUTSTANDING ENERGY EFFICIENCY

Overview

The Award for Outstanding Energy Efficiency is sponsored by the Cement Association of Canada with the support of Natural Resources Canada (NRCan) and recognizes exceptional energy performance in a detached house built of concrete and certified to the R-2000 Standard. The competition for this award is held annually and offers one award for the winner and up to three honourable mentions.

Program Eligibility Requirements

Eligibility requirements are defined in terms of eligible applicant, method of construction, building form and R-2000 status:

- **Eligible applicant:** A builder or R-2000 manager on behalf of a builder who is a CHBA member.
- **Method of construction:** Concrete must be used as the primary structural material in all exterior load-bearing walls enclosing heated areas, and all concrete walls must be full height, running from footings to eaves (an attached unheated structure such as a garage, may be of non-concrete construction).
- **Building form:** Detached house built under Part 9 of the National Building Code or the provincial equivalent.
- **R-2000 status:** Built to the R-2000 Standard and registered as an R-2000 home.

Program Evaluation Criteria

The entries are evaluated on the basis of the energy they use. More specifically, awards will be given to the builder whose entry achieves the lowest energy use as calculated on the basis of HOT2000 data calculated by a licensed R-2000 plans evaluator a percentage of the R-2000 energy target set for the house.

SUMMARY OF THE GREEN BUILDING CHALLENGE AND GREEN BUILDING ASSESSMENT TOOL (GBTOOL)

Overview

The Green Building Challenge (GBC) started out as an international competition to determine which country had the “greenest” buildings. It has evolved into a cooperative process among some 20 countries to measure the performance of green buildings. The GBC is now an international research effort to develop a tool to evaluate the environmental impact of buildings. The research process involves a multinational team that determines the standards that are important for building performance, such as energy, materials and air quality. A host country selects one or more buildings that are showcased at an International Green Building Conference held every two years.

GBTool

The tool used to evaluate buildings is software referred to as the Green Building Assessment Tool or GBTool. GBTool was developed by NRCan on behalf of the GBC group of countries. The GBTool helps to assess and evaluate the energy and environmental performance of three building types: schools, small-scale office buildings and multi-family residences. The long-term goal of the GBC is to improve the GBTool so that it can be used internationally.

Long Term Goal

The ultimate goal is to develop buildings that contribute to global sustainability by conserving natural resources and minimizing energy use.

SUMMARY OF GREEN BUILDING STANDARD

Background

In March 2004, the National Association of Home Builders (NAHB) held its first meeting to discuss the development of NAHB's residential standard for green building. The results of the meeting showed general support for the standard development process and the make-up of the group set up to develop it. The group will include home builders, building supply manufacturers, representatives of scientific and environmental communities, as well as organizations representing forest-related issues, such as AF&P, Natural Resources Defence Council (NRDC) and the Forest Stewardship Council.

Developments

Stakeholders were divided into four modules, each charged with the task of reviewing guidelines related to one of the following subjects: land development, resource use and efficiency, energy efficiency and indoor air quality. Work is focusing on the following topics:

- Lot preparation and design
- Resource efficiency
- Water conservation
- Indoor environmental quality
- Energy Efficiency
- Homeowner education.

The standard is expected to be released in the fall of 2004 and will be the first national guideline for builders across the nation on building green.

Another organization, the Green Building Initiative (GBI), will work with the NAHB to support the development and delivery of builder-friendly green building programs across the county.

SUMMARY OF GREEN BUILDING INITIATIVE

Overview and Objective

The Green Building Initiative (GBI) is a resource for balanced, common sense education and information about energy efficient and environmentally sustainable building practices known as “green building”. The GBI is a not-for-profit education initiative supported by a broad cross section of manufacturing, wholesale and retail companies, associations, government organizations, NGOs and others interested in residential and commercial construction. The GBI’s aim is to promote practical approaches to green building that are both accessible to builders and affordable for consumers. The initiative does not provide a rating system.

Scope and Approach

The GBI helps builders, developers, architects, building material suppliers, building owners and others involved in residential or commercial building throughout North America better understand, anticipate and position their business relative to the growing trend to green building. Key activities include the following:

- Support builder and developer associations in their efforts to create, enhance and promote builder-friendly green building programs for their members.
- Provide web-based resources in support of these efforts.
- Research consumer attitudes on green building to help builders communicate with consumers.
- Host educational seminars on green building topics.
- Educate consumers through advertising and other kinds of media outreach.
- Recognize green building leaders through awards programs.

Builders have the opportunity to join the GBI.

Relation to NAHB’s Green Building Standard

The GBI supports the development of NAHB’s green building standard and will provide advice on how to use it as a starting point for a customized green building program.

SUMMARY OF “NET ZERO ENERGY HOME” PROPOSAL

Overview and Objective

The objective of this proposal is to encourage and promote the development of net zero energy homes in Canada. A Net Zero Energy Home is a home that, at a minimum, supplies to the electrical grid an annual output of electricity that is equal to the annual power purchased from the grid.

Background and Current Status

In 2004, a number of interested parties established an organization called the “Net Zero Energy Home Coalition” and began formulating an action plan to involve other stakeholders and government to implement the net zero energy home concept into reality. The Coalition is a multi-stakeholder group consisting of corporate, not-for-profit, environmental, non-governmental organizations and academic representation. Members include Thomasfield Homes, Dupont Canada Inc., Climate Change Central, Earth Energy Society of Canada, Xantrex Technology Inc., Canadian Solar Industries Association, Milton Hydro Distribution Inc., Canada Energy Efficiency Alliance and EnerQuality Corp. Pollution Probe and a member of Concordia University have agreed to serve as advisors to the Coalition.

Approach

From a technical perspective, the concept is to combine energy efficient construction which reduces demand for energy with onsite renewable energy generation, e.g., geothermal, solar thermal and photovoltaic power.

From a program development perspective, the Coalition is urging federal and provincial governments to offer incentives and opportunities to buyers of new homes to install on-site and renewable strategies. The Coalition is seeking a combination of 1) a federal government commitment to offer a reduction on the GST for the purchase of a new home and 2) a commitment from provinces to offer a provincial sales tax exemption or equivalent from the costs of materials used in the construction of the new home. These incentives would be used to upgrade the home to at least an R-2000 rating and to offset the premium of installing the heat pumps, solar thermal or photovoltaic systems.

The Coalition’s timeline for development and implementation of this proposal is long term, i.e., from 2006 to 2030. The Coalition has proposed a phased approach with pilot projects in major urban centres across Canada.

APPENDIX 1: SOURCES FOR THE PREPARATION OF SUMMARIES OF ENERGY EFFICIENCY HOUSING PROGRAMS AND RELATED INITIATIVES

The sources have been organized by program and initiative.

SUMMARY OF R-2000

Documentation

R-2000 Manual, July 2003

R-2000 Manual, Standard (Appendix A)

R-2000 Procedures Manual, Sept 2003

Interviewees and Reviewers

Louise Roux, NRCan

Jack Mantyla, CHBA

SUMMARY OF THE ENVIROHOME PROGRAM

Documentation

Builder Application Guidelines

Internet articles on EnviroHome

Interviewees and Reviewers

Don Johnston, CHBA

SUMMARY OF THE SUPER E® PROGRAM

Documentation

Internet Articles on Super E®

Internet article on Super E®: What is Super E

Internet article on Super E®: Technical details

Internet article on Super E®: Requirements for members

Internet article on Super E®: Super E House Program code of ethics

Internet article on Super E®: General Support

Internet article on Super E®: Design Professionals

Internet article on Super E®: For more information

Internet article on Super E®: Canada's Super E® House Program: Overview for Builders

Excerpts from the Super E House Program Manuals (Japanese and UK)

Super E House Program Manual: An Overview of the Super E House Program

Super E Technical Requirements (Japan)

UK Super E® Standard

Supplementary Training Annex

Licensing Agreement (General)

Interviewees and Reviewers

Jeff Culp, Super E Office, NRCan

SUMMARY OF THE NOVOCLIMAT PROGRAM

Summary provided by Hugh Ward, Principal of Forum Habitation

SUMMARY OF THE ENERGUIDE FOR HOUSES (EGH) PROGRAM

Documentation

EnerGuide for Houses: Administrative and Technical Procedures
EnerGuide for Houses: Energy Advisor Workshop Manual (training manual and service delivery kit for energy advisors)
NRCan Summary Report
Buildings Group Research Report, April 16, 2004
Letter of invitation from Building Insight
Adding Up the Savings for Your New Home (brochure)

Interviewees and Reviewers

NRCan staff

SUMMARY OF THE BUILT GREEN™ ALBERTA PROGRAM

Documentation

Built Green™ Alberta Advantage Builder Package
Built Green™ Alberta Checklist 2003
Profile (magazine of the CRHBA), November 2003)
Built Green™ web site: Home
Built Green™ web site: About Built Green™
Built Green™ web site: Home Buyer
Built Green™ web site: Home Builder
Built Green™ web site: Home Builder-Builder Training
Built Green™ web site: Renovator
Built Green™ web site: Calendar of Events
Built Green™ web site: Checklist

Interviewees and Reviewers

Kevin Gunn, Enervision
Dave Bengert, Chair of Built Green™ Alberta

SUMMARY OF THE LEED™ PROGRAM

Documentation

LEED Homes Update, January 2004
LEED Rating System, Version 2.0, June 2001
LEED Canada for facilitating the use of the LEED Green Building Rating System, June 2003 (DRAFT ONLY)
LEED-BC Adaptation Guide for facilitating the use of the LEED Green Building System™, April 2004
Building a Sustainable House: LEED Residential from CMHC, 2001
LEED™ Points for Rating Masonry, article in Construct Canada, March 2004
Articles from the Internet on CaGBC

Interviewees and Reviewers

Ian G. Theaker, Canada Green Building Council

SUMMARY OF THE ENERGY STAR PROGRAM

Documentation

Internet articles on ENERGY STAR in the US

Internet article: “What is ENERGY STAR” (US)

Internet article: “History of ENERGY STAR” (US)

Internet article: “ENERGY STAR Qualified Products” (US)

Internet article: “Improve Your Home” (US)

Internet article: “ENERGY STAR Qualified New Homes” (US)

Internet articles on ENERGY STAR in Canada

Internet article: “The International ENERGY STAR[®] Symbol (Can)

Internet article: “ENERGY STAR Qualified Products” (Can)

Internet article: “ENERGY STAR – Home Appliances” (Can)

Internet article: “ENERGY STAR – Heating, Cooling and Ventilating” (Can)

Internet article: “ENERGY STAR – Windows and Sliding Glass Doors” (Can)

CMHC Report: “Guide on the Energy Star Program for Canadian Housing Exporters (US)

ENERGY STAR slide presentation

NAHB News Release, May 2003

Energy Star Labelled Manufactured Homes: Design, Manufacturing, Installation and Certification Procedures

Interviewees and Reviewers

Brian Killins, NRCAN (partial review, i.e., responded to specific questions, not to the summary)

SUMMARY OF THE POWER SMART PROGRAM IN BC

Documentation

Power Smart Brochure

Articles on BC Hydro’s Power Smart web site

Interviewees and Reviewers

Patrick Mathot, Power Smart-BC

SUMMARY OF THE POWER SMART PROGRAM IN MANITOBA

Documentation

Articles on Manitoba Hydro’s Power Smart Web Site

Manitoba Hydro/Power Smart New Home Program: letter and attachments

Interviewees and Reviewers

Kimberley Cooper, Manitoba Power Hydro Smart

SUMMARY OF THE BUILDING CANADA PROGRAM

Documentation

“Building Canada” Proposal: Development of a Service to the Construction Industry by EnerQuality Corporation

Daily Commercial News, January 31, 2001

Internet articles on Building America

Internet article on EnerQuality Corporation

CMHC Research Highlight 04-115, “Building Canada: Phase 1”

Interviewees and Reviewers

Sylvain Quiliam, NRCan
Peter Love, EnerQuality Corporation
Joe Waugh, Builder

SUMMARY OF GREEN GLOBES

Documentation

Web site: Green Globes - Welcome
Web site: Green Globes - FAQs
Web site: Environmental Assessment of Existing Buildings
Web site: Environmental Assessment for New Buildings
Web site: Environmental Assessment for New Buildings-Criteria
Web site: GEM UK
CMHC Research Highlight, Technical Series, No. 2001-119
Home page: BRE Environment Assessment Method
Article: Green Leaf Eco-Rating Program

Reviewer

Jiri Skopek, President of ECD Energy and Environment Canada Ltd.

SUMMARY OF ENVIRONMENTAL CHOICE PROGRAM

Documentation

Web site for Environmental Choice Program

SUMMARY OF HEALTHY HOUSING CONCEPT

Documentation

CMHC Web site on healthy housing

OVERVIEW OF THE HEALTHY HOUSING RECOGNITION PROGRAM

Documentation

Internet article: Health Housing Recognition Program
Internet article: Minimum Requirements Checklist

Interviewees and Reviewers

Bill Crawford, CMHC

SUMMARY OF CANADA'S ENERGY EFFICIENCY AWARDS

Documentation

Internet article: Welcome to Canada's Energy Efficiency Awards 2005
Internet article: The Awards Process
Internet article: The State of Energy Efficiency in Canada, OEE Report 2003
Internet article: Housing Section of web site on Canada's Energy Efficiency Housing Awards

Reviewers

Review by NRCan requested but no written comments received.

SUMMARY OF AWARD FOR OUTSTANDING ENERGY EFFICIENCY

Documentation

Web site for Cement Association of Canada's Award for Outstanding Energy Efficiency

SUMMARY OF THE GREEN BUILDING CHALLENGE AND GREEN BUILDING ASSESSMENT TOOL (GBTOOL)

Documentation

NRCan's web site on GBTool

Internet article on GBC 1998-2002

Web site for US Department of Energy on International Green Building Challenge

SUMMARY OF THE GREEN BUILDING STANDARD

Documentation

Wood Promotion Network Partner Update, March 23, 2004

Web Site of Wood Promotion Network

Web Site: NAHB – Green Homebuilding Guidelines

Internet Article: Green Building Initiative Web Site

SUMMARY OF THE GREEN BUILDING INITIATIVE

Documentation

Report: The Green Building Initiative from NAHB (through CHBA)

Internet Article: Green Building Initiative Web Site

SUMMARY OF "NET ZERO ENERGY HOME" PROPOSAL

Documentation

Solplan Review, May 2004

Toronto Star, May 29, 2004

Report: Net-Zero Energy Home Coalition

Reviewer

Gordon Shields