

6840



Waterloo Region Green Home

A public demonstration of energy efficiency
and environmental responsibility in new housing

Welcome to the Waterloo Region Green Home!

In the summer of 1991, CANMET, the main research and technology development arm of Energy, Mines and Resources Canada, challenged the building industry to design and build houses that promoted energy efficiency and environmental responsibility. The Kitchener-Waterloo Home Builders Association and Enermodal Engineering Limited answered that challenge—and the result is the Waterloo Region Green Home.

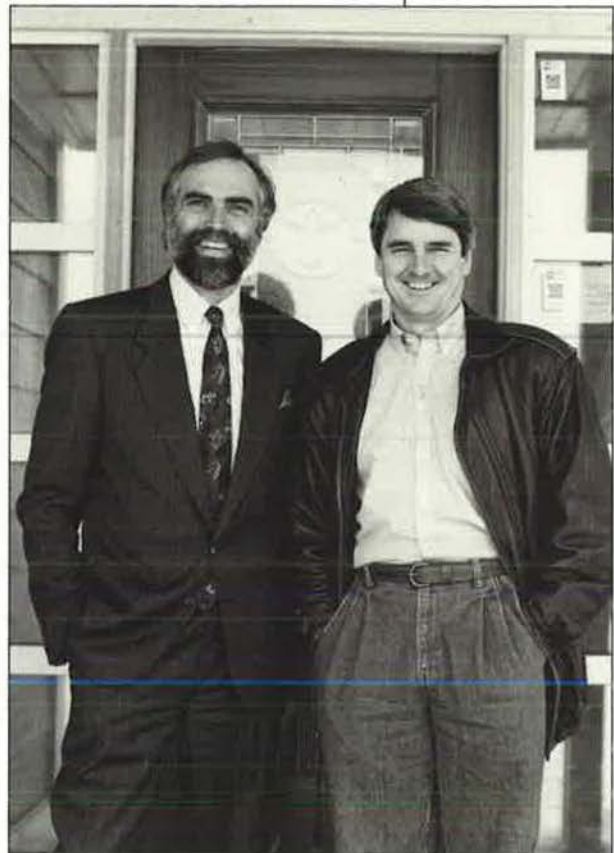
The Green Home demonstrates design features and technologies that meet the environmental challenges of the 90s. As you tour the Green Home, you will see how this house is designed to consume significantly less energy, water and construction materials in comparison to a conventional house, and how the builders avoided ozone-depleting chemicals and minimized construction waste sent to the landfill. All this in a house that is comfortable, has good air quality, and saves the homeowner between \$1,200 and \$2,000 per year in energy and water costs. We're sure you will agree that this house represents a positive step forward.

The Waterloo Region Green Home is an ambitious undertaking, and requires the support of many organizations. The back of this booklet lists those people and organizations who contributed their time, money and products to the project. We greatly appreciate their support. A special thanks to Union Gas Limited and Ontario Ministry of Environment and Energy for providing the funding to produce this booklet.

The building industry has rallied around this project. Our goal is to show how the technologies and systems demonstrated here can be used in your present and future homes. The Green Home is open to the public until early 1994. We invite you to come and see these exciting developments in housing!

Ian Cook
President,
K-W Home Builders Association

Stephen Carpenter
President,
Enermodal Engineering Limited



Left to right: Stephen Carpenter of Enermodal Engineering Limited and Ian Cook of the Kitchener-Waterloo Home Builders Association, welcome you to the Waterloo Region Green Home.

Table of Contents

Design	2	Electric Appliances	10
Form	3	Lighting	11
Building	4	Landscaping	12
Finishes & Furnishings	6	Waste Management	13
Heating & Cooling	7	Final Product	14
Plumbing	8	Economics	15
Natural Gas Appliances ...	9	Project Sponsors	16

 Printed on 100% Recycled Paper

Welcome!

Designing Houses with the Environment in Mind

The design team was given a formidable task: design a home that demonstrates the latest developments in energy efficiency, water conservation, waste management, chlorofluorocarbon (CFC) elimination and environmentally-appropriate materials. In addition, the house should reflect changing family size, be affordable, be pleasing to the home-buying public and harmonize with conventional building practices. To meet these goals, building materials were carefully selected to minimize the following environmental impacts.

Energy Use - Most building materials and products either require energy to operate or have a direct impact on building energy use (e.g. insulation). A number of problems are associated with energy use, including global warming, acid deposition, smog, radioactive contamination, use of land for dams and power corridors and thermal pollution. By carefully selecting the most energy-efficient components, these effects can be minimized.

Ozone Depletion - Several manufactured refrigerants, when released to the atmosphere, destroy the earth's protective ozone layer. The most damaging chemicals are CFCs followed by HCFCs. These refrigerants are used to operate refrigerators and air conditioners and as a blowing agent for some foam insulations. Many manufacturers now offer products that are CFC-free.

Resource Depletion - The manufacture of building materials usually requires the consumption of material resources. The over-use of virgin and/or non-renewable resources may eliminate these resources for future generations or cause irreparable damage to the landscape. By emphasizing construction materials from recycled sources and minimizing materials from unique or non-renewable sources, resource depletion is reduced.

Water Use - In many municipalities, fresh water is in short supply. This resource can be more wisely managed through the installation of low-water use fixtures and appliances, and landscape planning for reduced watering needs.

Manufacturing Emissions - Manufacturing can cause environmental damage to air, land and water. Materials selected in the Green Home have low impact on the environment during their manufacture.

Embodied Energy - This is energy used to produce, transport, install and dispose of the product at the end of its life. By choosing products carefully, environmental effects due to embodied energy can be reduced.

Environmental Emissions - Many materials used in house construction continue to release contaminants into the house and the external environment over their lifetime (this is called off-gassing). The most common building air contaminants are urea-formaldehyde and volatile organic compounds (VOCs). These contaminants can be found in paints, fabrics, carpets and glues used in particle board. Careful selection of materials can limit these emissions and ensure good air quality.

Disposal - Any building material has the potential of ending up at the landfill site, where decomposition of the material may be a source of environmental pollution. Materials that are recyclable can decrease landfill use.

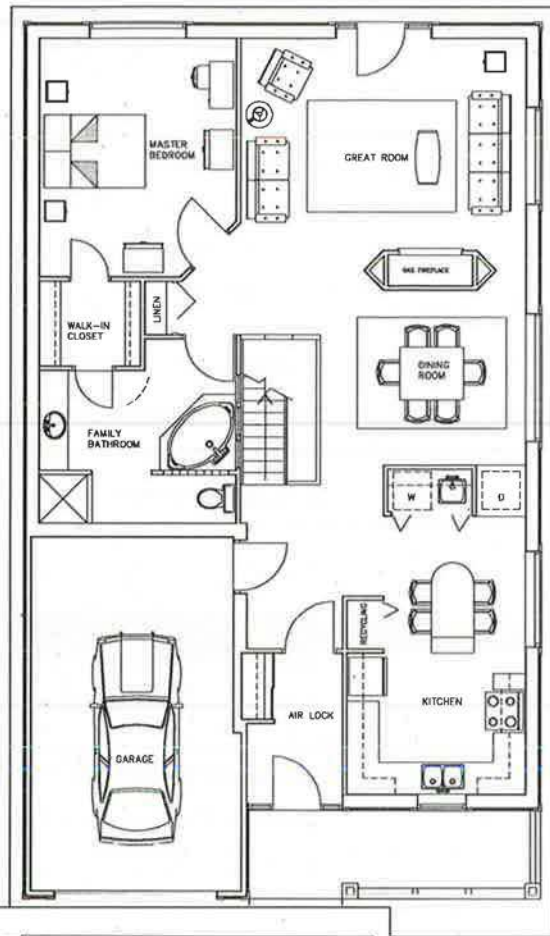
House Form

The Green Home is a raised bungalow that looks conventional from the outside. However, many innovative concepts are incorporated into the house design to improve energy efficiency and reduce the amount of construction materials. The design philosophy is to have the minimum exposed surface area (the smallest size outside) with the maximum use of interior space (234 square metres / 2500 square feet of finished floor area).

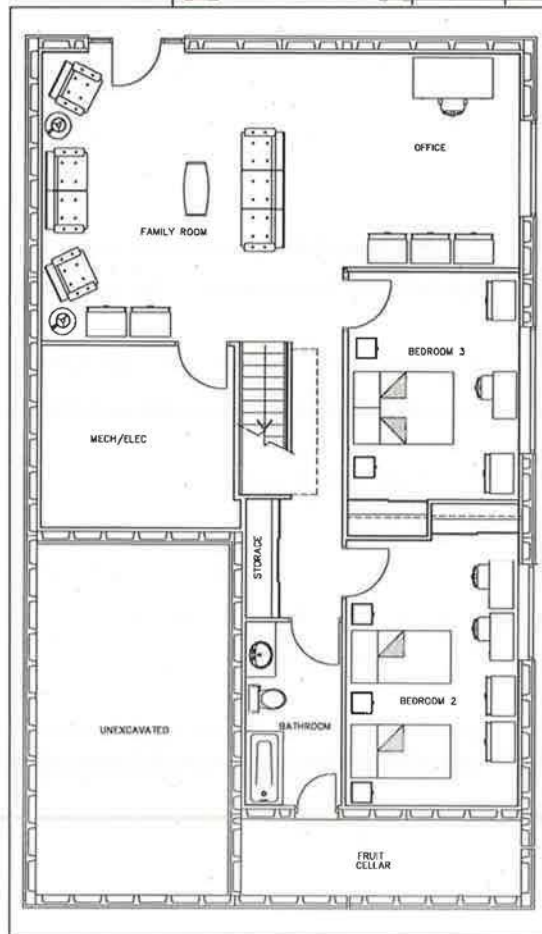
Exposed surface area is kept to a minimum by using a square house "footprint" and avoiding irregular facades. Visually-appealing front and back porches, southern overhang and a garage are used to avoid a "boxy" look. The dormer on the south side of the home allows natural light to penetrate to the interior. The garage is oversized to permit storage of seasonal items, instead of using valuable heated indoor space for storage.

In most houses, basements are dark, susceptible to dampness and used for mechanical equipment and storage space. Given that a house without a basement would be difficult to sell, the Green Home makes maximum use of the basement. The house is raised so that the basement floor is only 1.2 metres (4 feet) below grade on the south side instead of the more conventional 2.0 metres (6.6 feet). The extra height above grade allows for larger windows, creating a more desirable living space. With extra storage space in the garage, most of the basement is fully finished. The basement includes two bedrooms and a full bathroom so that it could be used as a separate apartment for grandparents, guests, or as extra space for a growing family. Basement bedrooms have several advantages: they increase occupant density, thereby resulting in a more efficient use of available resources, and take advantage of natural temperature stratification (cool bedrooms are more comfortable for sleeping in both winter and summer).

In conventional homes, attics are also under-utilized space. In the Green Home, the great room, dining room and master bedroom have vaulted ceilings, making use of previously unused attic space. The vaulted ceiling results in a moderately steep roof suitable for proper orientation of solar collectors (see plumbing section).



Upper level floor plan



Lower level floor plan

Form

Building Shell

The Green Home building shell components are a major departure from conventional building practice. The Green Home shell is energy-efficient, draft-free, durable and made from a minimum of materials. The heat loss from the Green Home is less than half that of a conventional new home (see Table on page 5 for a comparison of insulation levels).



Precast concrete panels for basement walls

Basement walls are constructed of precast concrete panels with steel reinforcing up to 5 metres (16 feet) in length. The panels are flat on the outside and resemble a waffle on the inside. While the panels are 200 mm (8 inches) thick at the reinforcing, they are only 50 mm (2 inches) thick in the middle. The result is a system that uses only half the concrete of a poured basement wall and contains voids that can be easily filled with insulation. The foundation system does not require continuous footings, only pads at each end, making it easier to fully insulate under the floor slab. The floor slab is insulated with 50 mm (2 inches) of pentane-blown polystyrene insulation.

Above-grade walls are framed using trusses as the studs. Each truss is made up of two load-bearing members connected by a thin web. The truss system is factory-built with the scraps re-used, thereby eliminating construction waste. The truss wall has many advantages over conventional stud walls, including less material and site labour requirements. The load-bearing members are made of laminated strips from fast growing trees and the webs are made from wood scraps. Thus, this wall system

consumes fewer trees in its manufacture than a conventional home, and the lumber it uses is not from old growth forests. The wall truss can be made very wide to accommodate extra insulation and reduce the need for exterior insulation. For the Green Home, the wall cavity is filled with 235 mm (9.3 inches) of wet-blown cellulose insulation manufactured from recycled newspapers and then covered with a combination strand board/steam-blown isocyanurate insulated sheathing.

A six-mil polyethylene vapour retarder is used on the interior of all walls and ceilings. All seams are sealed with sheathing tape instead of acoustical sealant to reduce off-gassing. Drywall, containing a minimum of 25% recycled wastes and without paper covering, is used on interior walls.

The truss system used for above-grade walls is also being used for above-grade flooring to reduce wood usage. Because this truss system is stronger than a conventional floor, it allows 600 mm (24 inch) joist spacing instead of the conventional 400 mm (16 inches). Even considering the slightly thicker sub-floor (22 mm, 7/8 inch) used to provide rigidity, the truss floor system uses 35% less wood than a conventional floor.

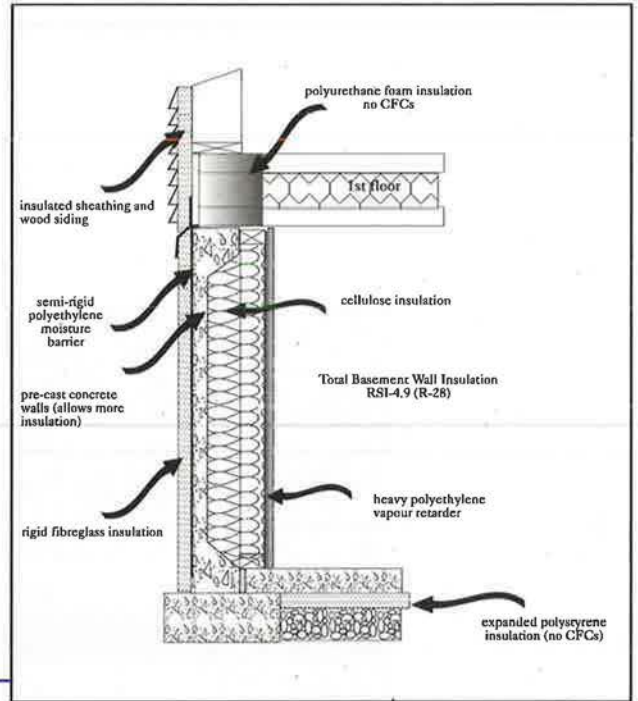
The exterior cladding is scrap wood pressed into an attractive wood siding. Exterior trim, soffits and flashing were made of steel instead of aluminum. The manufacture of aluminum requires larger amounts of energy and produces more pollution than the making of steel.

Roof trusses are factory-built to minimize waste and improve quality control. The trusses are constructed almost entirely out of 2x4s instead of the commonly used 2x6s and 2x8s, so that rapid-growth trees can be used. Steel roofing was selected instead of asphalt shingles because it has a high recycled-material content, lasts the life of the building, and can be recycled. Asphalt shingles last only 10 to 20 years, emit VOCs (volatile organic compounds), and present difficulties in safe disposal.

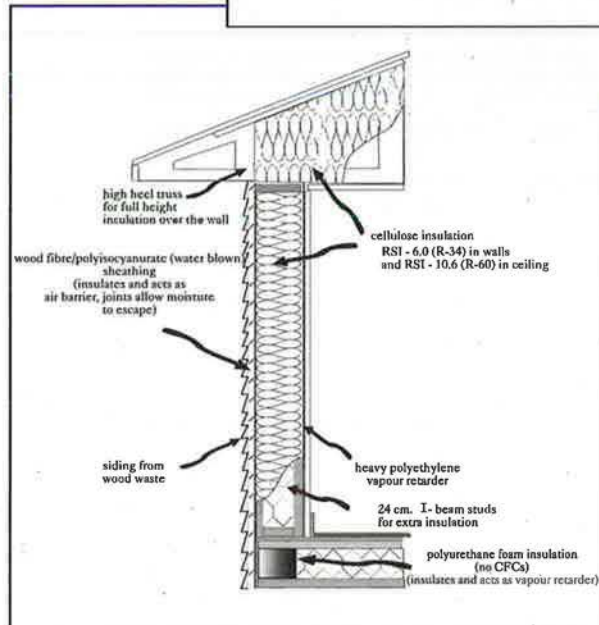
Windows and glass inserts for doors were selected to have high solar heat gain and low heat loss. They are triple-glazed with two low-emissivity coatings, low conductivity edge spacers and filled with argon gas. The window frames are foam-filled fibreglass. The chosen window has the highest Energy Rating of all windows registered in the Ontario Hydro High-Performance Window Incentive Program.

Windows are located to maximize winter heat while minimizing summer heat gains, and are sized to avoid house overheating. A thermo-chromic film is added to the dormer window and some of the south-facing windows to further reduce solar gains on hot sunny days. The film is transparent below 24°C (75°F) and turns white above this temperature, thus reflecting most of the solar gain.

The exterior doors are constructed from polystyrene foam insulation covered with a durable fibreglass skin. The foam is blown with non-ozone depleting pentane.



Lower level wall cross-section



Upper level wall cross-section

Insulation Levels		
	Conventional New Home	Green Home
Above-Grade Walls	RSI 3.0 (R17)	RSI 5.9 (R34)
Below-Grade Walls	RSI 1.5 (R8.5)	RSI 4.9 (R28)
Floor Slab	0	RSI 1.4 (R8)
Ceiling	RSI 5.6 (R32)	RSI 10.6 (R60)
Doors	RSI 0.5 (R3)	RSI 1.1 (R6)
Window Energy Ratings		
Fixed	-15	+8
Operable	-30	+17

Building

Finishes & Furnishings

Finishes and Furnishings

The interior finishes and furnishings were carefully selected to address all environmental issues. In keeping with the reuse and recycle theme, all of the furniture used in the Green Home are antiques and yard sale design-finds. Accessories and artwork complement the furniture and create a south-western feeling.

Indoor air quality is improved by using materials that don't release toxic chemicals such as urea formaldehyde and volatile organic compounds (VOCs). Urea formaldehyde resins are commonly found in carpets, drapes, fabrics and glued wood products. VOCs are found in paints, adhesives and caulking. Many products are now available that don't contain these chemicals. Particle board furniture was avoided and the pine-faced kitchen cabinets were sealed with acrylic latex to reduce off-gasing. VOCs were avoided by using VOC-free latex paints and rubber-based adhesive tapes and silicone caulking. Drapery fabric is a chemically untreated, down-proof cotton, with acrylic-based fabric paints used for colour.

Resource depletion and disposal were addressed by re-using products wherever possible. The main floor hardwood flooring was recovered from a demolished building. A refurbished bathtub and sink are used in the lower floor washroom. Flooring tiles made from recycled glass, instead of petroleum-based vinyl, are used in the front entrance

and bathrooms. Recycled materials were also used in the carpeting (manufactured from P.E.T. – plastic pop bottles) and the gypsum underlay for the tile floors contains used paper products.



Refurbished bathtub



Carpeting from recycled plastic pop bottles

Heating and Cooling Equipment

Space heating and ventilation is handled by a prototype combined furnace/heat recovery ventilator (HRV). This Canadian-developed system uses a conventional mid-efficiency natural gas furnace connected to a small container of rocks with two compartments. Stale air from the bathrooms and kitchen mix with the furnace flue gases and pass through the first compartment of rocks. The large surface area of the rocks ensures that almost all of the heat in the exhaust air is removed and stored in the rocks.

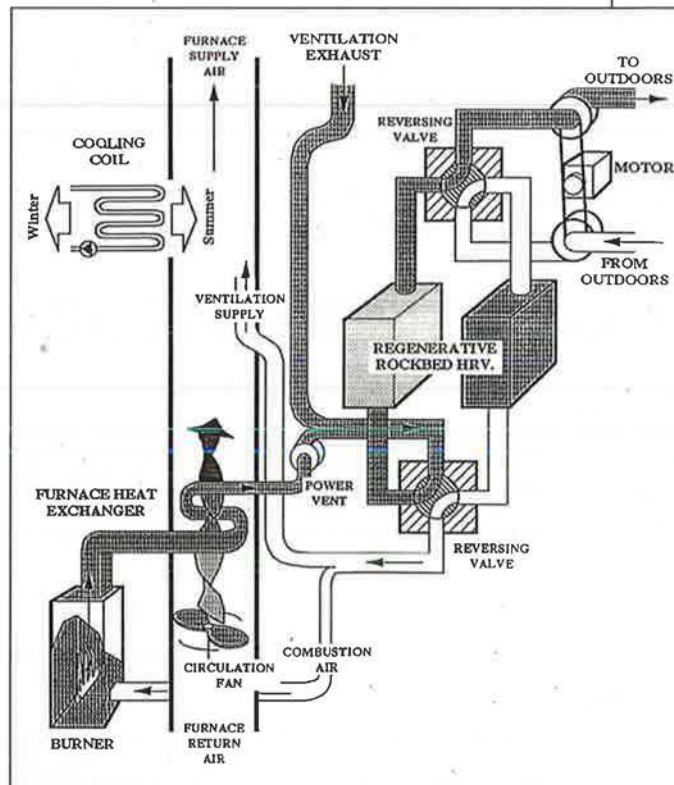
Outdoor air is heated by the rocks as it passes through the second compartment of rocks. Approximately every five minutes, a reversing valve switches the air streams to the two rock compartments, and thus, the heated rocks are cooled and cooled rocks are heated. The outdoor air is distributed throughout the house via furnace ductwork. Products of combustion are prevented from re-entering the house by pressurizing the fresh air stream.

This system has two main advantages over conventional furnaces and HRVs. First, it is very efficient. According to previous in-field performance testing, the combined system was more efficient than a condensing natural gas furnace and standard HRV. Second, when commercialized, this system will be less expensive than a condensing natural gas furnace and standard HRV, because it is integrated into one package and does not require a stainless steel heat exchanger.

The house and landscaping were designed, and appliances selected, to reduce the need for mechanical cooling. A small cooling system was installed to maintain comfort conditions on very hot days. To avoid the use of freon-based cooling systems, the outside ground and rainwater (collected in a cistern) are the cooling sources. When cooling is required, cistern water is circulated through plastic tubing buried below the basement floor slab and through a coil in the air-handling system.

Circulating fans can be the largest consumer of electricity in a house. Several design features were added to decrease fan energy requirements. All ductwork is slightly oversized and fitted with turning vanes to reduce friction losses. The cooling coil is on a sliding track so it can be easily removed in the winter to further reduce air friction. High-efficiency motors minimize electricity use. A high-efficiency pleated air filter is used instead of electricity-consuming electro-static air cleaners.

Figure 5 Furnace/HRV System Schematic



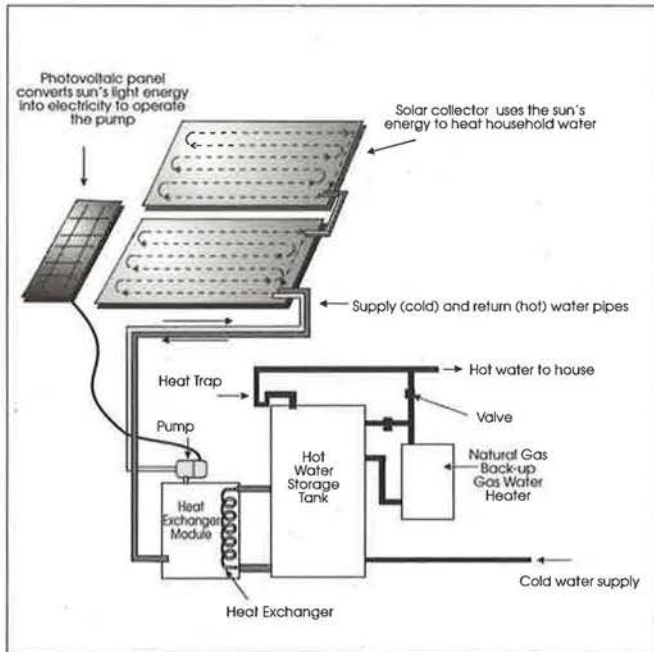
Schematic of furnace/HRV system (courtesy REIC)

Heating & Cooling

Plumbing Systems

Plumbing systems were designed to reduce hot and cold water consumption and to use natural water sources. The two toilets require only 2 and 3 litres (0.5 and 0.75 gallons) per flush instead of the standard 20 litres (5 gallons) per flush. One of the toilets liquifies the waste to aid in flushing. The shower has a low-flow showerhead and manual

Schematic of solar water heating system



shut-off to conserve water when lathering. Aerators restrict bathroom and kitchen faucets to a flow of 6 litres (1.5 gallons) per minute. The hard water found in Waterloo region requires the use of a water softener. The Green Home water softener is water conserving, regenerates only when necessary and softens only the hot water. The result is a softening system that uses only a third of the water of a conventional system. The cistern collects rainwater for watering the garden, flushing the toilets and supplying cold water for clothes and car washing. All piping contains recycled copper.

A solar water heating system supplies the majority of the hot water needs. A high-efficiency low-power pump is controlled and powered by photovoltaic (PV) cells that convert sunlight directly into electricity. Driving the solar heat collection pump by PV power eliminates the need for a controller, simplifying

installation and providing better performance (since the pump flow rate varies with amount of sunlight). The system does not need any external electricity to operate, and thin flexible tubing connects the collectors to the storage tank for easy installation. During the months of low sunlight, a high-efficiency, natural gas-fired wall-mounted boiler supplements the solar heat.



This toilet liquifies the waste to aid in flushing, using only 10% the water of a conventional toilet

Plumbing

Natural Gas Appliances

After conservation, natural gas is the fuel of choice. Natural gas releases one sixth the amount of carbon dioxide compared to electricity produced by coal-burning plants. Flexible stainless steel conduit simplifies the installation of gas lines. Six appliances, in addition to the furnace and water heater, are powered by natural gas.

Clothes Dryer - A solar-powered clothes dryer — a clothes line — is the primary drying source. During periods of bad weather, a natural gas dryer can be used. The dryer is controlled by a moisture sensor to minimize dryer run-time. The dryer gets its air from the outdoors to avoid de-pressuring the house.

Stove - A prototype direct-vent natural gas stove incorporating a ceramic counter top is used for cooking. This stove has improved efficiency and vents combustion products to the outdoors.

Fireplace - The direct-vent natural gas fireplace features spark ignition and fan-assisted heat delivery to ensure high efficiency. Outdoor air is used for fireplace combustion.

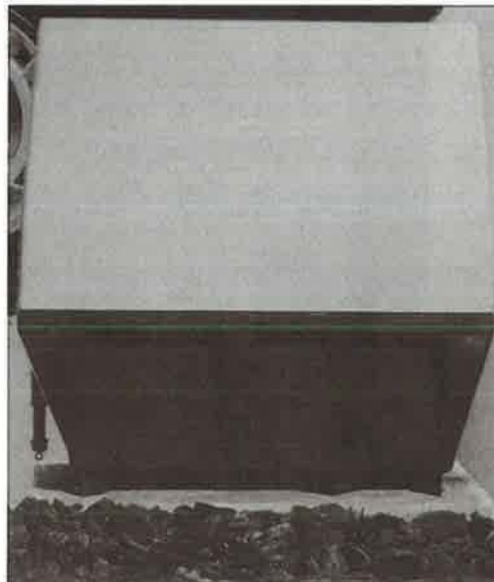
Barbecue - Natural gas barbecues emit less air pollutants than charcoal barbecues and reduce summer air conditioning requirements by keeping the cooking heat outside.

Vehicle Refuelling Appliance - Vehicles are the largest source of urban air pollution. Natural gas vehicles are cleaner burning than gasoline - or diesel - powered vehicles. The vehicle refuelling appliance located beside the garage, means homeowners can refuel their car at home.

Space Heater - For the demonstration period, the garage is being used as a showroom. The room is being heated by a through-the-wall vent natural gas space heater. This product is ideal when renovating houses with electric baseboard heating.



Natural gas stove with ceramic counter top offers improved efficiency



Natural gas vehicle refuelling appliance

Natural Gas Appliances

Appliances

Electric Appliances

Refrigerator and freezer compartments have separate compressors for greater energy efficiency



Refrigerator - Food is stored in a refrigerator and freezer unit with separate compressors. It is inefficient to operate a single refrigeration system to supply the extremely cold temperatures required for a freezer and simultaneously

cool a refrigerator. These Danish-made appliances use a non-ozone depleting refrigerant and a non-CFC blown insulation.

Clothes Washer - The German-made washing machine is front loading with a high-speed spin dry. This front-loading machine consumes 60% less water than top loaders. The spin dry part of the washer cycle operates at 1600 rpm instead of the more conventional 600 rpm, reducing the clothes water content from 100% to 50%. The lower moisture content cuts drying time and dryer energy consumption in half. The washer also features a high-efficiency DC motor for agitation.

Dishwasher - The dishwasher needs only 20 litres/wash, half the amount of conventional dishwashers.

Microwave - This new generation of microwaves has the element closer to the food and rotates the element, providing a more even and efficient heat.

Small Appliances - In general, it is more efficient to heat water in a small appliance than on a stove. The Green Home features an electric kettle and a coffee-maker with a thermos flask.

Alternatives to Powered Appliances

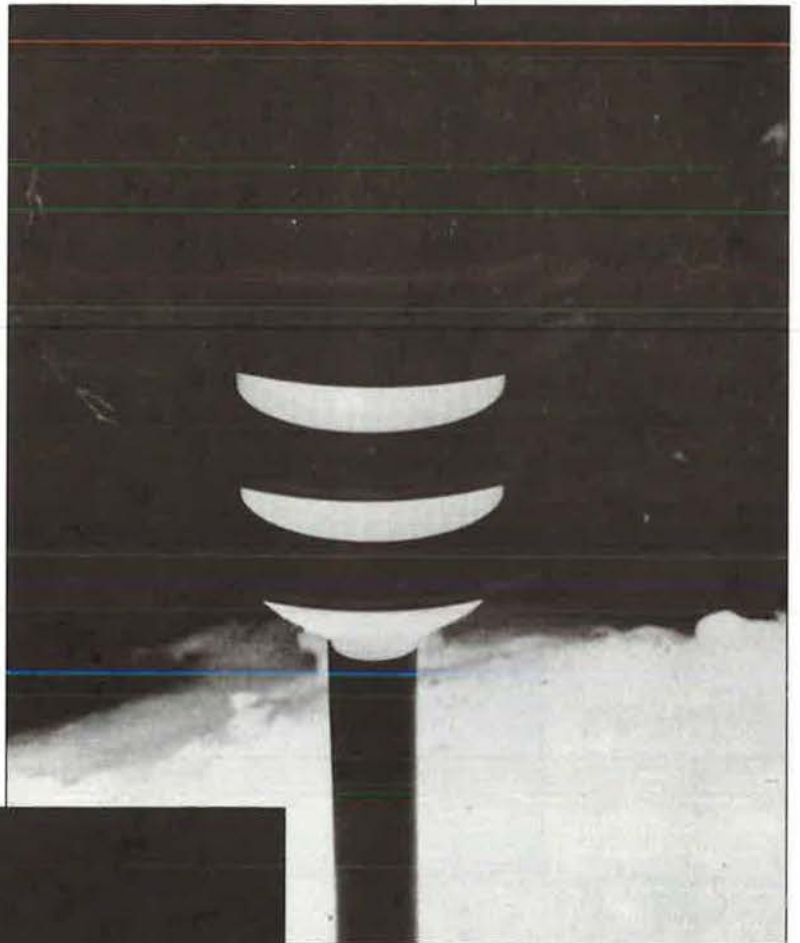
Many appliances require electricity to operate, where hand-operated ones would do just as well. Hand appliances are less expensive, more reliable, longer lasting and don't use any electricity. Hand appliances in the Green Home include a can opener, can crusher (for recycling), lawn mower and garden clippers. A solar-powered battery recharger is available for those appliances running on batteries. A bicycle and storage rack are located in the garage. Pedal power is more efficient and less polluting than automotive power.

Lighting

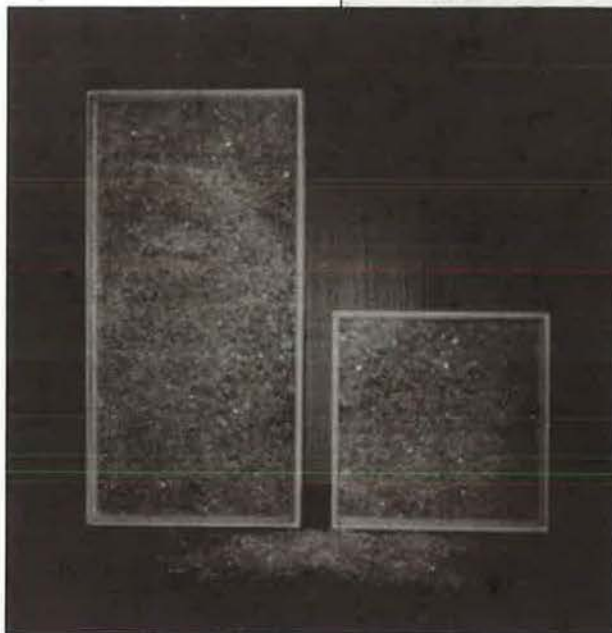
The most efficient lighting source is daylighting. Windows are carefully placed throughout the house to allow natural light into all rooms. An interior glass wall (made from recycled glass) admits natural light from the dormer windows into the north-side bathroom.

Most of the electric lighting systems are either full-spectrum T8 fluorescent tubes with electronic ballasts or compact fluorescent lamps. The lighting design emphasizes task lighting in which spot lights illuminate a specific area and not an entire room. In areas where lights are rarely used (e.g. closets), standard incandescent lights are controlled by timers to make sure the lights are not left on when not required.

Outdoor lighting demonstrates many ways costs can be reduced. The exterior house lighting features compact fluorescent lighting. The garden and yard lighting is solar powered: electricity generated during the day is stored for use at night.



The yard and garden are lit by solar-powered fixtures

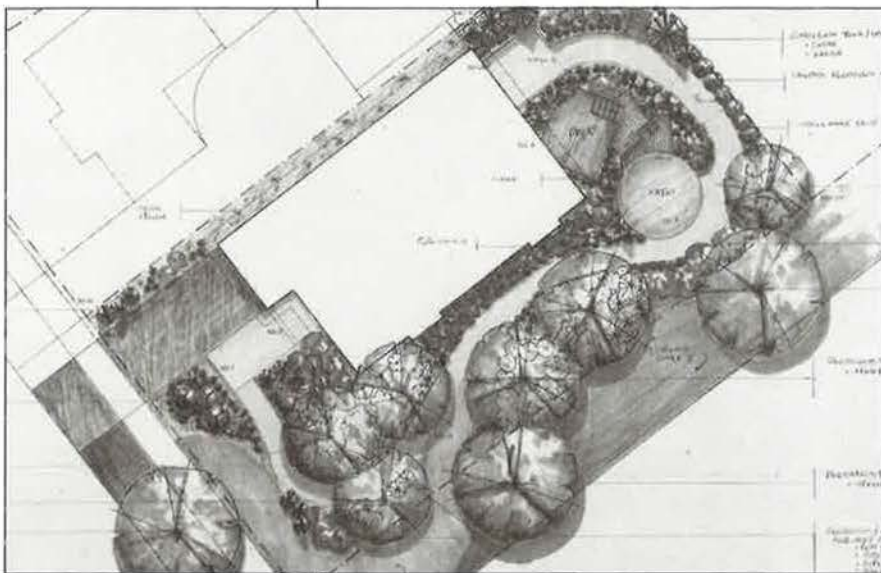


Recycled glass wall brings natural light to the north side of the house

Lighting

Landscaping

Sketch of landscape design



Landscaping at the Green Home applies the underlying philosophy of environmental responsibility to the building lot. The landscaping creates an aesthetically pleasing setting for the homeowner while providing a positive effect on the local environment.

The landscape plan emphasizes the use of native plant species selected for hardiness, drought resistance and the provision of habitat for butterflies, birds and other wildlife. Trees and shrubs include white oak, downy serviceberry, red osier dogwood and bearberry. Deciduous trees are located so as to reduce house summer cooling loads and maximize winter solar gains. Woodland plants such as lady ferns and Solomon's seal and flowers such as lobelia and sedum are also used. Ground covers of perennial rye and fescue grasses and white dutch clover were

selected because of their drought resistance and tolerance to foot traffic.

Aside from the low-water-demand plant material, several features are incorporated into the design to reduce water requirements. On-site water retention is maximized by terracing steep slopes and using hollow-core paving units in the driveway. Plantings are heavily mulched with shredded bark to reduce evaporative moisture loss, to lower soil temperatures and to allow rain water to soak into the ground.

The soil is supplemented with composted horse manure (mushroom farming by-product) to boost organic content, gypsum from waste drywall to improve drainage, and organic fertilizers to improve productivity.

An organic vegetable garden is a key element of the landscape plan. Growing food organically reduces the chemical contamination of ground and water. Local food production also addresses a number of other important environmental issues such as transportation and agricultural energy, bio-diversity and self sufficiency. On-site composting of yard and kitchen waste provides soil enrichment and eliminates organic matter from landfill garbage.

The manufactured materials used in the landscape include pre-cast concrete retaining walls rather than pressure treated lumber and recycled rubber walkway paving units; these materials eliminate toxic chemicals that leach into the ground.

Landscaping

Waste Management During Construction

A comprehensive waste management program was undertaken to reduce the impact of house construction and operation on the environment. The program was based on reduce, reuse, and recycle—in that order.

The first of the three “Rs” requires a reduction in the amount of waste produced. The use of premanufactured components, such as ceiling, wall, and floor trusses, result in no cutting or waste generation at the construction site. At the factory, end cuts are reused for blocking. For site-built components, order quantities were close to exact requirements with excess material returned to the supplier for re-use. Corrugated stainless steel conduit was used in the Green Home for natural gas piping. Because the piping was cut to exact lengths and connected



Premanufactured components resulted in less waste during construction

with compression fittings, no waste was produced. Thin-wall “sausage pack” caulking tubes are an innovative alternative to conventional caulking tubes. The amount of packaging is extremely small and the reusable nozzle allows remaining caulking to be used when a new tube is installed in the gun.

The second “R” is reuse. Much of the wood waste was taken by contractors for use on other job sites. Wood pallets and tarpaulin quality packaging were reused for storage of materials at other construction sites. Insulation scraps and other inert materials were placed in the attic for added insulation. Drywall scraps were inserted in interior walls for extra thermal storage. Leftover paint was either taken to another construction site or another coat was put on the walls.

Recycling was also incorporated into the construction practices. Concrete left over from pouring the floor slab was set in a field, crushed and used as aggregate on other construction sites. Recyclable materials such as cardboard and steel were taken to the Waterloo Waste Management Facility for recycling. Materials that were not accepted at the local facility were taken to other recycling facilities.

Waste Management in the House

The three Rs are also the basis of an effective household waste management program. Bulk buying in refillable containers reduces unnecessary packaging and allows plastic containers to be reused indefinitely. A selection of environmentally appropriate household products available in bulk are on display.

The kitchen recycling centre allows separation of materials for recycling in the blue box program and local recycling depots. Composting diverts organic waste from the landfill and provides rich soil for the yard and garden. A compost container is located in the kitchen and a composter is in the yard.

Waste Management

The Final Product

Detailed calculations and computer simulations of the Green Home's energy consumption were completed, and compared to the energy consumption of a similar house built using conventional practices and materials and meeting the Ontario Building Code (OBC). The house will be monitored in 1993 and 1994 to confirm the energy and water efficiency of the house.

The Green Home performance is impressive. It has a peak space heating requirement of 4 kilowatts, the equivalent of three hair dryers. Space heating costs will average only \$8. a month! Annual electricity usage is expected to be under 4000 kWh; the average Ontario home uses 12,700 kWh for lights and appliances. In total, the Green Home uses only 28% of the energy of a similar-sized new home. Water use is only 26% of the standard home in Waterloo region.

Homeowners are expected to save between \$1200 and \$2000 annually in utility costs depending on the type of fuel used, over what they would have spent in a similar home built to the OBC. The savings would be even greater in comparison to older or larger homes. In addition, society as a whole benefits from reduced greenhouse warming, acid rain and freon emissions and lower power plant and water filtration construction costs. The table below compares the cost of operating both types of houses.

In summary, the Green Home consumes less than 30% of the energy and water of a typical new home.

	UTILITY COST (\$/YEAR)*		Green Home
	Conventional House		
	(Electric Heat)	(Gas Heat)	
Space Heating	935	343	97
Water Heating	447	230	18
Cooling	157	157	21
Natural Gas Appliances	0	0	29
Electric Appliances	519	519	160
Lighting	118	118	54
Fans	175	175	173
Gas Fixed Charge	0	90	90
Water & Sewage	345	345	106
TOTAL COST	\$2696	\$1977	\$748

*Based on 1992 Waterloo utility costs.

Economics

Accurately determining the cost of the Waterloo Region Green Home is difficult, for several reasons. Several components (such as the direct-vent natural gas stove and combination furnace/HRV) are prototype units and are not, as yet, commercially available. The manufacturers of these products, however, expect they will sell for a cost similar to the equipment they replace.

Since the Green Home is a demonstration house, several possible solutions to a situation were presented, whereas the cost effective approach would be to select just one. Water heating, for example, is being done by a solar heating system and a high-efficiency natural gas water heater, where it is more economical to install just one of these systems. Many of the other costs are purely decorative (such as hardwood floors) or are strictly for improved comfort or health (sealing kitchen cabinets to prevent release of urea formaldehyde). Finally, extra costs were incurred due to our desire to build a truly superior product, such as the steel roof which will last the lifetime of the house.

Nevertheless, each product in the house was carefully chosen to represent a cost-effective, environmentally appropriate alternative to conventional building practice. In some cases, the systems used were less expensive than conventional practice. Recycled glass for drainage and cellulose insulation are examples of capital cost-saving products.

Acknowledging the difficulties in costing the Green Home, it is estimated that the monthly payments on a 25-year mortgage would increase by \$150, within a few dollars of the monthly savings in energy and water. Some financial institutions are providing reduced-rate and/or larger mortgages to those homeowners with energy-efficient houses because of the reduced monthly operating costs. In addition, homes that use less energy and water (and are therefore cheaper to operate), have good resale potential.

The few extra dollars a month for this type of house, are a good investment when the returns are a superior house, improved comfort and air quality, and a positive contribution to your personal and global environment.

Economics

Project Sponsors

The Waterloo Region Green Home is a joint venture of

Kitchener-Waterloo Home Builders Association
and Enermodal Engineering Limited

Principal Sponsor

CANMET, Energy, Mines and Resources Canada

Project Sponsors

Bank of Montreal
City of Waterloo
Ontario Ministry of Environment and Energy
Ontario Hydro
Ontario Ministry of Housing
Regional Municipality of Waterloo
Union Gas Limited

Project Supporters

City of Kitchener
Heating, Refrigeration and Air Conditioning Institute
Landscape Ontario
Ontario Electrical League
Waterloo North Hydro
Kitchener Utilities

Management:

project and construction management	Enermodal Engineering: 368 Phillip Street, Waterloo, ON N2L 5J1 John Kokko and Stephen Carpenter, 519-884-6421
project management	Ian Cook Construction Limited: 169 Lexington Court, Waterloo, ON N2J 4R4 Ian Cook, 519-746-6244
construction management	RTS Homes: 589 Wingrove Court, Waterloo, ON N2T 2C1 Werner Reiter, 519-888-7474
architectural services	Snider Reichard & March Architects: 145 Columbia Street West, Waterloo, ON N2L 3L2 Richard Reichard, 519-885-5600

Communication:

communication and design services	Beyond Words Design and Communication, 695 Rupert Street, Waterloo, ON N2V 1Z5 Sharon MacKinnon, 519-885-4091
video production services	Avard Productions: 128 Radcliffe Drive, Kitchener, ON N2E 1Y5 Bill Moffatt, 519-745-5044
camera operating services and rentals	Edcom Multimedia Products: 350 Unit #6 Shirley Avenue, Kitchener, ON N2B 2E1 Mark Lehman, 519-578-2260
printing services	Waterloo Printing Company Ltd., 50 Bridgeport Road East, Waterloo, ON N2J 2J6 Mike Litwiller, 519-886-4750

Support:

accounting services	Deloitte & Touche: 175 Columbia Street West, Waterloo, ON N2L 5Z5 Carman Lagonia, 519-747-3207
insurance services	Prudential Assurance: 101 Frederick Street, Kitchener, ON N2H 6R2 Barry Kennedy, 519-888-5700
insurance services	Smith McNaughton Insurance Brokers Ltd.: 25 Bruce Street, P. O. Box 220, Kitchener, ON N2G 3Y5 Maureen E. Sztadinski, 519-578-6030
legal services	McCarter, Grespan, Robson: 675 Riverbend Drive, Kitchener, ON N2K 3S3 Paul Grespan, 519-571-8800
design assistance	R.E.I.C.: 15101 Yonge Street, Aurora, ON L4G 1M6 Chris Gates, 416-841-5551
design assistance	Elizabeth White Consultant: Marsh Hill Farm, R.R.4 Stirling, ON K0K 3E0 Elizabeth White, 613-395-5392
building lot	Freure Homes Ltd.: 501 Krug Street, Kitchener, ON N2B 1L2 David Freure, 519-578-7771
building lot	George Wimpey Canada Ltd.: 80 North Queen Street, Toronto, ON M8Z 5Z6 416-233-5811

Building Shell:

civil engineering consulting	MTE Consultants Inc.: 279 Weber Street N., Waterloo, ON N2J 3H8 Allan Hayes P.Eng., 519-884-0410
structural design	Sze Straka Engineers Ltd.: 105 Baffin Place, Unit #1, Waterloo, ON N2V 2C1 Yulun Sze, 519-884-9881
surveying services	Campbell, Wyman, Auer Ltd.: 582 Frederick Street, Kitchener, ON N2B 2A9 Gary Auer, 519-745-4791
construction labour	Eric Schuele Construction Ltd.: 607 Eastgate Walk, Waterloo, ON N2K 2W1 Eric Schuele, 519-884-1921
construction labour	Northlake Homes Limited: 1-608 Weber N., Waterloo, ON N2V 1K4 Pat Rooney, 519-885-3681
construction labour	Van Dyke Construction Company Ltd.: 16 Sutton Place, Kitchener, ON N2E 2W5 Ralph Van Dyke, 519-576-3990
recycled aggregate	Kieswetter Cartage and Excavating Company Ltd.: P.O. Box 231 Heidleberg, ON N0B 1Y0 Roger Kieswetter, 519-699-4445
recycled aggregate and gravel	Tri-City Ready Mix: R. R. 3, St. Clements, ON N0B 2M0 Rick Esbaugh, 519-699-4880
recycled crushed glass for aggregate	Regional Municipality of Waterloo Waste Management Centre: 925 Erb Street West, Waterloo, ON N2J 3Z4 519-883-5118
excavating, sand and gravel services	Sittler Excavating: 316 Arthur Street S., Elmira, ON N3B 2P4 Steve Sittler, 519-669-2456
concrete	Canada Building Materials: P.O. Box 483, Kitchener, ON N2G 4A2 Chuck Chambers, 519-744-6544
concrete floor finishing	Tony Mueller Construction: 69 Silverspring Crescent, Kitchener, ON N2M 4P3 Tony Mueller, 519-743-3938
polyethylene basement waterproofing	Engineered Basement Solutions, P.O. Box 188, 350 Woolwich St. S., Breslau, ON N0B 1M0 Cam Wood, 519-648-2164 or 519-241-1625
insulating exterior sheathing	American Excelsior Company c/o Daritek Agencies: P.O. Box 434, Morin Heights, PQ J0R 1H0 David Aller, 514-226-7968
cellulose insulation material	Climatizer Wall Insulation System Ltd.: 120 Claireville Drive, Etobicoke, ON M9W 5Y3 John Wooller, 416-798-1235
ceiling insulation installation	Comfort Control Insulation Inc.: 377 Forest Ave, St. Thomas, ON N5R 2K8 Caven Kuhn, 519-637-0544
fibreglass insulation	Fiberglas Canada Inc.: 585 Springbank Drive, London, ON N6J 1H3 Jane Williams, 1-800-461-3089
fibreglass insulation with recycled glass	Ottawa Fibre Inc.: 3985 Belgreen Drive, Box 415, R.R. #4, Ottawa, ON K1G 3N2 Nicholas J. Holownia, 613-736-1215
underslab polystyrene insulation	Plasti-Fab Ltd.: 1214 Union Street, Kitchener, ON N2G 4G1 Doug McNabb, 519-571-1650 or 1-800-265-8927
polyurethane insulation	Strassburger Insulation Ltd.: 646 Colby Drive, Waterloo, ON N2B 1A2 Cliff Strassburger, 519-885-6380
ceiling cellulose insulation and cardboard insulation stops	Therm-O-Comfort: 85 Forest Street, Aylmer, ON N5H 1A5 Terry Wiley, 519-773-8498
BIBS cellulose installation and insulating materials	Way-Mar Aluminum Inc.: R.R. 3, Wallenstein, ON N0B 2S0 Bob Shantz, 519-699-4236
porch railings, posts and recycled plastic lumber	Berlin Porch & Spindle: P. O. Box 239, Baden, ON N0B 1G0 John Iclanzan, 519-634-5369

Project Sponsors

Project Sponsors

lumber and building supplies	Fairway Lumber Company Ltd.: St. Jacobs, ON N0B 2N0 Grady DeVrieze, 519-664-2226
roof trusses, trim and lumber	Gillies Lumber: 777 Industrial Road, Cambridge, ON N1S 4J2 Wayne Freund, 519-653-7181
standard drywall	Fackoury's Building Supplies: 629 Colby Drive, Waterloo, ON N2V 1B4 Mark Fackoury, 519-746-8130
vapour barrier and drywall installation	Nietsch Drywall Systems Inc.: R.R.1 Petersburg, ON N0B 2H6 Manfred Nietsch, 519-634-8651
gypsum with waste paper underlayment and wallboard	Louisiana-Pacific Canada Ltd.: 75 Loyalist Drive Welland, ON L3C 2X9 Mark Allister, 416-464-1348
oriented strand board subfloor	MacMillan Bloedel Building Materials, 111 Bleams Road, Kitchener, ON N2C 2G2 James Ward, 519-894-2222 or 1-800-265-8265 or 1-800-265-8282
structural composite lumber and wooden I joists	Trus Joist MacMillan: 86 Guided Court, Suite 10, Rexdale, ON M9V 4K6 Art Cote, 1-800-263-2325
interior stairs and railings	Lisan Woodworking: 9-31 McBrine Drive, Kitchener, ON N2C 2A2 Lib Santos 519-748-5988
sealant and caulking	Tremco Ltd.: 220 Wicksteed Avenue, Toronto, ON M4H 1G7 Robert Buchanan, 416-421-3300
contractors sheathing tape	Canadian Technical Tape Ltd.: 135 East Drive, Bramalea, ON L6T 1B5 Wayne Riviere, 416-791-3980
equipment rental	BNR Equipment Rental: 1182 Victoria N., Kitchener, ON N2B 3C9 Terry Speigelberg, 519-578-4950
steel roof	Tile Master Roofing Systems: 1060 Colborne Street E., Brantford, ON N3T 5M1 Renate Kreitner, 1-800-461-3805
roof and window installation	Tri-City Windows and Doors: Unit 1B, 100 Campbell Avenue, Kitchener, ON N2H 4X8 Manny Gomes, 519-570-3131
wood siding	Canexel Hardboard a division of Canadian Pacific Forest Products: P.O.Box 1020, 79 Main Street, Gatineau, PQ J81 6K2 Dennis Courte, 819-643-7282
installation of siding	Kenmar Siding Company Ltd.: 33 Rothsay Avenue, Kitchener, ON N2B 3A3 Paul Martin, 519-571-0123
vapour barrier	W. Ralston (Canada) Inc.: 135 East Drive, Bramalea, ON L6T 1B5 Wayne Riviere, 416-791-3980
vapour barrier detail	Rainbow Insulation: 59 McGee Avenue, Kitchener, ON N2B 2T1 Oliver Nabrotzky, 519-696-3202
air barrier house wrap	Du Pont Canada, Box 2200, Streetsville, Mississauga, ON L5M 2H3 Pete Russel, 416-821-3300
high-performance windows	Accurate Dorwin Company: 60 Nairn Avenue, Winnipeg, MB R2L 0X5 David Yeo, 204-667-5078
insulating edge spacer for windows	Edgetech I. G. Ltd.: 39 Vaughan Street, Ottawa, ON K1M 1W9 Michael Glover, 613-749-0624
low-e glass for windows	Libbey-Owens-Ford: 1701 East Broadway, Toledo, OH USA. 43605 Rex Tracht, 1-800-526-6557
lineals for windows	Omniglass Ltd.: Suite 13, 9-1329A Niakwa Road East, Winnipeg, MB R2J 3T5 Laurie Davies, 204-256-3767
insulated glazing unit fabrication	Sunlight Insulating Glass Manufacturing Ltd.: 1416 Bonhill, Mississauga, ON L5T 1L3 Dieter Gollnow, 416-564-8235
glazing unit installation	McKerlie Solar Systems: 1527 Upper Ottawa Street, Hamilton, ON L8W 3E2 Dave McKerlie, 416-388-3459
automatic window shading	Suntek: 6817A Academy Parkway East, Albuquerque, NM, 87109 Rachel Bernstein, 505-345-4115
exterior fibreglass doors	Pease Industries Inc.: 22 Noble Ct, Georgetown, ON L7G 1M6 Ken Irwin, 416-873-1554
high-performance door lites	Baylite Division of Bay Mills Ltd.: 7299 David Hunting Drive, Mississauga, ON L5S 1W6 Dan Darcy, 416-672-2255
insulating spacer for door lites	BayForm Division of Bay Mills Ltd.: 500 Barmac Drive, Weston, ON M9L 2X8 Charles Ball, 416-746-0662
delivery of doors	Boncor Building Products Inc.: 640 Wilton Grove Rd., Unit 12, London, ON N6A 4C2 Pat Cogan, 519-668-6632
sidelight/door assembly	Crescent Supply: 598 Colby Drive, Waterloo, ON N2V 1A2 Rob Balcerzak, 519-884-1961
storm doors	Madawaska Doors Inc.: P.O. Box 850, Bolton, ON L7E 5T5 Brett Delmas, 1-800-263-2358
garage door	K-W Door Installations Inc.: B-291 Victoria Street North, Kitchener, ON N2H 5E1 AlPffuegl, 519-742-3667

Interior Finishings and Furnishings:

interior design	Anderson Schnurr & Associates: 24 Regina St. N., Waterloo, ON N2J 3A1 Shelley Anderson, 519-888-9702
floor finishing, sourcing and installation	Vic Sellner Limited: 1659 Victoria Street North, Kitchener, ON N2B 3E6 Jeff Sellner, 519-576-7160
reused hardwood floors	Kieswetter Demolition: Box 231 Heidelberg, ON N0B 1Y0 Ken Kieswetter, 519-699-4445
interior crushed glass window and shower stall artwork	Reflective Trends: 285 Weber Street North, Waterloo, ON N2J 3J2 Tom Uznanski, 519-725-2489
closet organizers and mirrored doors	Strauss Home Products: 550 Parkside Drive, Waterloo, ON N2L 5V4 Bob Strauss, 519-746-8150
kitchen cabinets	Olympia Cabinets K-W Ltd.: 652 Colby Drive, Waterloo, ON N2V 1A2 Mike Bitsakakis, 519-884-6180
fireplace mantel	Vissan Designs Limited: 483 Lisgar Avenue, Renfrew, ON K7V 3N6 David Ainsworth, 613-432-8181
antique furnishings	Dovetail Collectibles: Cambridge, ON Annette Richardson, 519-653-8664, or Lyn Campbell, 519-623-7362
interior wood trim	Weber Home Centre: 761 Bridge Street, New Dundee, ON N0B 2E0 Randy Weber, 519-696-2232
trim labour	Abode Fine Craftsman: 18 Musselman Cres., Conestogo, ON N0B 1N0 Ray Mercy, 519-664-1481
paint	Benjamin Moore: 139 Mulock Avenue, Toronto, ON M6N 1G9 416-766-1173
paint	Heer's Decorating & Design Centres: 677 Belmont Blvd West, Kitchener, ON N2M 1N8 Bob Heer, 519-578-5330
recycled paint	Scarfe Paint Ltd.: Box 217, R.R. #4, Owen Sound, ON N4K 5P3 Ron Coates Jr., 519-376-0460
painter	Daniel Gallant: 708 Glenforest Blvd., Waterloo, ON N2L 4K8 519-888-6066

Heating and Cooling:

mechanical contracting and design	Electrolee Products Inc.: 40 Baffin Place, Waterloo, ON N2V 1Z7 John Lee, 519-884-2091
furnace/ventilation unit	Canadian Gas Research Institute: 55 Scarsdale Road, Don Mills, ON M3B 2R3 Robert LaFontaine, 416-447-6465
heating system installation	K-B Combustion Ltd.: 85 Howard Place, Kitchener, ON N2K 2Z4 Brad Mavin, 519-745-7303
duct design	Intercity Products Inc.: 20 East Pearce Street, Richmond, ON L4B 1B7 Allan Wallace, 416-221-6980
duct fabrication	The Welmar Group Mechanical Contractors Inc.: 47 Lewis Road, Guelph, ON N1H 1E9 Brian Richards, 519-763-6633
duct material and fabrication	Reitzel Heating & Air Conditioning Ltd.: 665 Superior Drive, Waterloo, ON N2V 2C8 Alan Reitzel, 519-884-3510
air filter	Trion Canada Inc.: 130 Otonabee Drive, Kitchener, ON N2C 1L6 Cec Archibald, 519-895-0570
fan motor	GE Motors Canada: 107 Park Street North, Peterborough, ON K9J 7B5 Mike Belanger, 705-748-7163
polyethylene piping for underslab cooling loop	Dura-Line Corporation: P. O. Box 1445, Middlesboro, KY, USA 40965 Martin Cumpston, 1-800-847-7661

Plumbing System:

concrete cistern	Acton Precast Concrete Limited: R. R. 2, Acton, ON L7J 2L8 David Turner, 1-800-461-1516 or 519-853-1529
bath tub	Tomlin Industries Inc.: 623 Colby Drive, Waterloo, ON N2V 1B4 Ralph Boehler, 519-884-5290
bath tub	Vanity Mart Bath & Kitchen Ltd.: 90 Frobisher Drive, Waterloo, ON N2V 2A1 Gary Terpstra, 519-886-3240
refinished bathtub and pedestal sink	Porcelain Magic: P.O. Box 651 Station E, Kitchener, ON N2G 4B6 Steve Campbell, 519-748-4040
2 litre flush toilet	Control Fluidics, Inc.: 124 West Putnam Avenue, Greenwich, CT, USA 06830 Donald Jermier, 203-661-5599 David Del Porto, 508-369-3951
shower head and faucets	Moen Inc.: 2816 Bristol Circle, Oakville, ON L6H 5S7 Gerry Swift, 1-800-465-0279
automatic infra-red faucet	Nepitec Ltd.: P.O. Box 5581, Station F, Nepean, ON K2C 3M1 Angelica Salley, 613-723-8090

Project Sponsors

Project Sponsors

water softener	Petwa Water Conditioning: 625 Wabanaki Drive, Kitchener, ON N2C 2G3 Bob Rittenhouse, 519-893-8887
hot water storage tank	AO Smith Enterprises Ltd.: 768 Erie Street, Stratford, ON N5A 6T3 George Pick, 519-271-5800
high-efficiency direct-vent gas water heater	Delta-Temp Corporation: 6140 Main Street, Stouffville, ON L4A 1A5 Donald Kimura, 416-640-5454
P.V. powered solar water heater	Thermo Dynamics Ltd.: 81 Thornhill Drive, Dartmouth, NS B3B 1R9 James Allen, 902-468-1001
weeping tile and sump pit	Patene Building Supplies Ltd.: 1290 Victoria St. N., Kitchener, ON N2B 3C9 Dan George, 519-745-1188
drainage services	Aqualine Drain Ltd.: 17 Belton Drive, Kitchener, ON N2M 2B7 Conrad Lang, 519-744-8009
plumbing services	Paton Brothers Ltd.: 169 Lexington Court, Unit E, Waterloo, ON N2J 4R4 Ken Jamieson, 519-885-2140 or 1-800-265-8802

Natural Gas Appliances:

fireplace	PowrMatic: 1155 Barmac, North York, ON M9L 1X4 Terry Hicks, 416-744-7206
fireplace	Security Fireplace: 1380 Hopkins Street, Whitby, ON L1N 5S1 Don McInroy, 416-668-8112
fireplace installation	Ross Heating & Air Conditioning: 978 Bishop Street N., Cambridge, ON N3H 4V6 Terry Petrie, 519-650-0070
clothes dryer	Inglis Limited: 1900 Minnesota Court, Mississauga, ON L5N 6H2 Ray Doll, 416-858-6300
space heater	Hunter: P.O. Box 400, Orillia, ON L3V 6K1 Victor Koby, 705-325-6111
stove	Canadian Gas Research Institute, 55 Scarsdale Road, Don Mills, ON M3B 2R3 Tony Joseph, 416-447-6465
barbecue	T.A. Appliances: 932 Victoria Street North, Kitchener, ON N2B 1W4 Doug Hudson, 519-578-0300
barbecue outlet box	Pneumateck Industries Ltd.: 185 Frobisher Drive, Waterloo, ON N2V 2E6 C. Reg Willis, 519-747-2240
vehicle refuelling appliance	Union Gas Limited NGV (Natural Gas for Vehicles), Dept: NGV Hotline 1-800-265-5277
corrugated steel piping	Union Gas Limited: 603 Kumpf Drive, Waterloo, ON N2V 1K8 Larry Noble, 519-885-7400 ext.332

Electrical Appliances:

refrigerator	Vestfrost: Spangsbjerg Mollevvej, Postbox 2079, Denmark-6705 Esbjerg 0 Carsten Valentin, 011-45-79-22-36
dishwasher, washing machine, vacuum cleaner	Miele Appliances Limited: 250 Shields Court, Unit #4, Unionville, ON L3R 9W7 Geoffrey Hedges, 416-474-1073
microwave oven	Camco Inc.: 245 Skymark Avenue, Mississauga, ON L4W 4H2 Eileen Hardy, 416-624-7125
tea kettle, thermal coffee carafe, dustbuster	Black & Decker Canada: 100 Central Avenue, Brockville, ON K6V 5W6 1-800-465-6070
security alarm products	Bond-Ray Protection Ltd.: 140 McGovern Drive, Unit #5, Cambridge, ON N3H 4R7 Brian Welwood, 519-650-5353
security system installation	Alliance Security Systems of Kitchener, 1258 Victoria Street North, Kitchener, ON N2B 3C9 Mike Fritz, 519-576-2220

Electrical:

electrical co-ordination	Victoria Electric: 1258 Victoria Street North, Kitchener, ON N2B 3C9 Greg Fritz, 519-576-2220
electrical services	Bill Snyder Electric Inc.: 39 Glasgow Street North, Conestogo, ON N0B 1N0 Bill Snyder, 519-664-1319
electrical services	Dunbar Electric: 14 Camden Place, Kitchener, ON N2B 1P8 Mark Dunbar, 519-743-8995
electrical services	Erbville Electric: R.R. 3, Waterloo, ON N2J 3Z4 Joe VanDerzand, 519-746-2022
electrical services	Golden Triangle Electric: 186 Sheldon Avenue North, Kitchener, ON N2H 3M8 Bob Schultz, 519-745-7513
electrical services	Greenview Electric: R.R. 1, St. Agatha, ON N0B 2L0 Roy Ziegler, 519-747-1748

electrical services	James May Electric: P.O. Box 1603, Kitchener, ON N2G 4R2 Jim May, 519-745-8484
electrical services	Jim Collison Electric: 427 Albert Street, Waterloo, ON N2L 3V2 Jim Collison, 519-884-6870
electrical services	Ron Hoy Electric Ltd.: 105 Rankin Street, Unit #3, Waterloo, ON N2V 1W2 Jim Rhodey, 519-746-2888
electrical services	Shantz & Brubacher Electric Inc.: 55 Austin Drive, Waterloo, ON N2L 3Y2 Ray Brubacher, 519-746-5955
electrical services	T & S Electric: 139 Hollinger Cres., Kitchener, ON N2K 2B5 Dave Turek, 519-743-0141
electrical services	Val U Electric: P.O. Box 33, Wroxeter, ON N0G 2X0 Dave Valentia, 519-335-6050
electrical services	Wasylycia Electric: R.R. 2, West Montrose, ON N0B 2V0 Harry Wasylycia, 519-664-2307
rough-in materials	Ellis & Howard / Graybar: 509 Mill Street, Kitchener, ON N2G 4E8 Laurena Rich, 519-576-4050
rough in materials	Westburne Supply ON: 101 Webster Road, P.O. Box 190, Kitchener, ON N2G 3Y4 519-893-1711
rough in boxes and materials	Guillevin International Inc.: 53 St. Leger Street, Kitchener, ON N2H 4M1 Brian Lynch, 519-576-7580
conduit, meter bases and service wires	Ruddy Electric: 5 Forwell Road, Kitchener, ON N2B 1W3 Mark Livingston, 519-579-5210
hydro panels and breakers	Wesco Supply: 10 Goodrich Drive, Kitchener, ON N2G 4J3 Al Bendia, 519-893-6630
monitoring sub-meters	E-MON Corporation: One Oxford Valley, Suite 418, Langhorn, PA 19047 David Bovankovich, James T. Leonard V, 1-800-334-3666
time-of-use utility meter	GE Meters Canada: 2300 Meadowvale Blvd., Mississauga, ON L5N 5P9 Ray Murphy, 416-858-5346

Lighting:

outdoor solar lighting	Siemen's Solar Industries: 4650 Adohr Lane, Camarillo, California, 93011 USA 1-800-233-1106
occupancy sensor	Pass & Seymour Canada Inc.: 448 North Rivermede Road, Concord, ON L4K 3M9 Brett Elliott, 416-738-9195
lighting fixtures	CFI Lightolier: 91 Skyway Avenue, Unit 100, Building C, Etobicoke, ON M9W 6C7 Lighting Concepts Centre, 416-674-6101
lighting fixtures	CFI (Division of Canlyte) / Insights Lighting Sales Ltd. / Lightolier (Division of Canlyte) / Oval Lighting Inc.: 221 Holiday Inn Drive, Cambridge, ON N3C 3T2 Jeff Proper, 519-651-1010

Waste Management:

cupboard recycling units and newspaper rack	MAB Designs: 39 Stuart Cres., North York, ON M2N 1A6 Mike Boadway, 416-512-9698
stackable recycling bins	Rubbermaid Canada Inc.: 2562 Stanfield Road, Mississauga, ON L4Y 1S5 Richard Hall, 416-279-1010 Ext. 287

Landscaping:

landscape design	Hensel Design Group Inc.: C109-151 Frobisher Drive, Waterloo, ON N2V 2C9 Mike Hensel, 519-725-4411
landscaping services	Fast Forest Inc.: 270 Shoemaker Street, Kitchener, ON N2E 3E1 Phil Dickie, 519-748-6610
landscaping services	York Nursery Ltd.: 1541 Highland Road West, Kitchener, ON N2G 3W7 Don Prosser, 519-745-9876
landscaping supplies	Pavestone Plus Inc.: R. R. 2, Cambridge, ON N2R 5S3 Steve Bender, 519-740-6000
landscaping construction services	J.R. Custom Landscaping Ltd.: 441 Lorindale St., Waterloo, ON N2K 2X2 John Pop, 519-742-6931
	Swiss Hills Landscaping, RR 1, Waterloo, ON N2J 2G8 Harry Cosford, 519-664-1179
	Gro-Bark Ontario Ltd., 700 Rupert St., Unit A, Waterloo, ON N2E 3C9 Bill McKague, 519-885-3411
	J-D Landscape Construction, 274 Courtland Avenue East, Kitchener, ON N2G 2V7 519-742-9379
	Courtesy Landscaping Ltd., B-1502 Victoria Street North, Kitchener, ON N2B 3E2 Rick Allischer, 519-741-1837

Project Sponsors

Project Sponsors

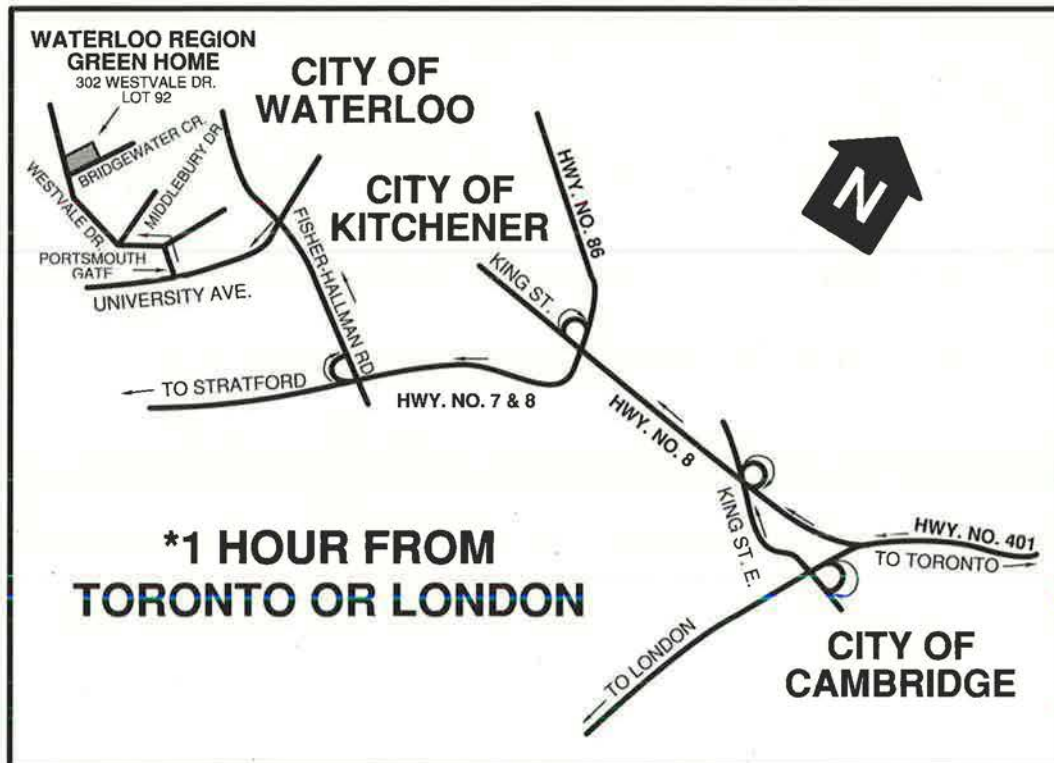
Terra-Care, Dan Boyle
 Nutrite, Chuck Eggleton
 Greenfield Nursery Ltd., RR1 Ayr, ON N0B 1E0
 Al Devries, 519-632-7592
 Colman Landscape Design, 49 Bloomingdale Road North, Kitchener, ON
 N2K 1A5 Lyn Colman, 519-742-4940
 Trees on Wheels, 652 Kortright Road West, Guelph, ON 519-763-2333
 Fleischauer Brothers Landscaping Ltd., 60 Woolwhich Street South, Breslau,
 ON N0B 1M0 John Fleishchauer, 519-648-2193
 Wright Lawn Care and Landscape Services, 76 Main Street, Bloomingdale,
 ON N0B 1K0 John Wright, 519-742-8433
 Cannon Nurseries (NVK), P.O. Box 200, Waterdown ON L0R 2H0
 Rick Vanderkruk, 416-628-0112
 Ontario Seed Company Ltd., 330 Phillip Street, Waterloo, ON N2J 3Z9
 Everett Nieuwkoop, 519-886-0557
 Decra-Loc Paving Stone Products, 60 Schaefer Street, Waterloo, ON N2L
 4C5 Glen Wiley, 519-884-0860
 Recovery Technologies, 5925 Airport Road, Suite 612, Mississauga, ON
 L4V 1W1 Rob Kover, 416-672-9448
 Adams R.M. Trucking Ltd., 483 Bridge Street East, Kitchener, ON N2K
 3C5 Randy Adams, 519-744-0151
 G. Young & Sons Contracting Ltd., 119 Hearth Cres.,
 Kitchener, ON N2M 1H1 James Young, 519-748-5479

Miscellaneous:

bicycle, stand and lock	Braun's Bicycle: 27 Scott Street, Kitchener, ON N2H 2P8 Robert Braun, 519-579-2453
interior products	Greenbacks, The Environmental Store: Westmount Place Mall, Waterloo, ON N2L 2R5 Roy Weber, 519-725-0293
household accessories	Home Hardware Stores Ltd.: 34 Henry Street West, St. Jacobs, ON N0B 2N0 519-664-2252
cleaning products	Generations: 75 Bridgeport Road East, Waterloo, ON N2J 2K1 Olaf Weig, 519-725-2986
window cleaning	Windowclean: 301C Bluevale Street North, Waterloo, ON N2J 4H6 Joe Brenner, 519-888-6830
cardboard model display	Dan Plan: 309 White Rock Crescent, Waterloo, ON N2V 1R7 Dan Schumacher, 519-746-1357
recycled pencils	Faber Castell Corporation: 2670 Plymouth Drive, Oakville, ON L6H 5R6 Cathy Logan, 416-829-5051

Green Home; an authoritative description

A detailed description of the Green Home design process is contained in the book: **Green Home** by Wayne Grady, Published by Camden House, available at the Green Home or your local bookstore.



Attention School Teachers

School groups are welcome to tour the Green Home. An education kit has been prepared suitable for grades 3 to 12. The kit covers pre-, post- and on-site tour activities. Contact the Green Home to make tour arrangements (519) 576-0306.

Further Information

The Waterloo Region Green Home is open to the public through spring 1994. Waterloo Region Green Home staff would be pleased to give you a tour of the house and answer any of your questions.

Hours of Operation

Monday, Tuesday	By appointment
Wednesday	10:00 a.m. to 5:00 p.m.
Thursday	10:00 a.m. to 8:00 p.m.
Friday	10:00 a.m. to 5:00 p.m.
Saturday	10:00 a.m. to 5:00 p.m.
Sunday	12:00 p.m. to 5:00 p.m.

Union Gas

The publication of this booklet was made possible by financial support from Union Gas Limited and Ontario Ministry of Environment and Energy.



Ontario

Ministry
of
Energy