

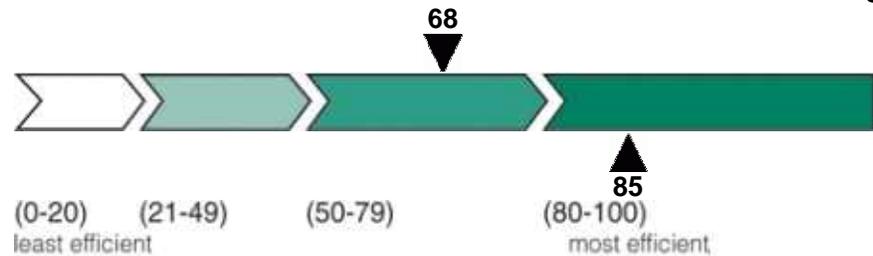
Energy Efficiency Evaluation Report

File number: 38JBD00202

Property Owner:

Victoria, British Columbia
V8V 2J2

EnerGuide Rating



House type: Single detached

No. of storeys: One

No. of RO windows: 13
RO = rough opening

Air conditioner: No

Heating system: Natural gas
Furnace

Domestic hot water: Electricity

Air leakage rate @ 50 Pa: 10.39 ACH
ACH = number of air changes per hour

Equivalent Leakage Area: 1329 cm²

The results of your pre-retrofit energy evaluation show that your house rates 68 points on the EnerGuide scale. If you implement all of the recommendations in this report, you could reduce your energy consumption by up to 57% and increase your home's energy efficiency rating to 85 points. The average energy efficiency rating for a house of this age in British Columbia is 56; whereas the highest rating achieved by the most energy-efficient houses in this category is 80.

Did you know that when you reduce the amount of energy used in your home, you also reduce the production of greenhouse gases (GHG) such as carbon dioxide? By improving your home's energy efficiency rating to 85 points, you will reduce its GHG emissions by 3.4 tonnes per year!

Remember that you have up to 18 months from the date of this report to complete your renovations and qualify for an ecoENERGY Retrofit - Homes grant. So the sooner you start your renovations, the earlier you will see the energy savings. And let's not forget how reduced energy consumption helps protect the environment.

Note: If you notice any discrepancies with the above description of your home, contact your service organization immediately.

Service Organization: City Green Solutions
Telephone: (250) 381-9995

Date of evaluation: March 3, 2008

Date of report: March 5, 2008

Certified Energy Advisor: Joy Beauchamp

Certified Energy Advisor Signature

1. YOUR HOME ENERGY ACTION CHECKLIST

This is your checklist of recommended retrofits to improve the energy efficiency of your home. Included are the federal grant amounts that you could receive as well as information on the potential for energy savings and EnerGuide rating improvement. For more information, read the 'Recommended Energy-Saving Measures' section of this report and the NRCan brochure entitled *Retrofit Your Home and Qualify for a Grant!* found in your ecoENERGY homeowner kit. Before undertaking upgrades or renovations, find out about the appropriate products and installation techniques, and ensure that all renovations meet local building codes and by-laws.

Note: Some provinces and territories offer complimentary grants and other incentives for reducing energy use. Refer to your local government for information on other energy-saving programs or visit ecoaction.gc.ca and follow the links to ecoENERGY Retrofit's "Grants and incentives" Web page or call 1 800 O-Canada (1-800-622-6232).

Retrofits	Federal Incentive	Potential for Energy Savings *	Potential Rating Improvement
These upgrades qualify for a federal grant up to a maximum total incentive value of \$5,000:			
* One (1) star = lowest savings / five (5) stars = highest savings			
HEATING SYSTEM			10.9 points
Install an ENERGY STAR® qualified air-source heat pump.	\$400		
Replace your wood-burning appliance with a clean-burning model that meets the required performance testing specifications.	\$300		
DOMESTIC HOT WATER SYSTEM (DHW)			2.8 points
Install a CSA-compliant solar domestic hot water system.	\$500		
ATTIC/ROOF INSULATION			1.6 points
Increase the insulation value of your attic from the current level, which is evaluated at RSI 2.1 (R-11.9), to achieve a total minimum insulation value of RSI 8.8 (R-50).	\$600		
WALL INSULATION			7.7 points
Increase your exterior wall insulation by an amount greater than RSI 1.59 (R-9).	\$1500		
WINDOWS AND DOORS			0.3 points
Replace 1 exterior door(s) with a model that is ENERGY STAR® qualified for climate zone A.	\$30		
AIR SEALING			0.7 points
Improve the air tightness of your house by 19 percent to achieve an air change rate per hour of 8.4 at a pressure of 50 Pa.	\$150		
WATER CONSERVATION		—	0 points
Replace 1 toilet(s) with low-flush or dual flush toilet(s) that meet(s) the minimum requirements.	\$50		

Natural Resources Canada (NRCan) reserves the right to update the grant amounts, as required.

2. THE ENERGUIDE RATING SYSTEM

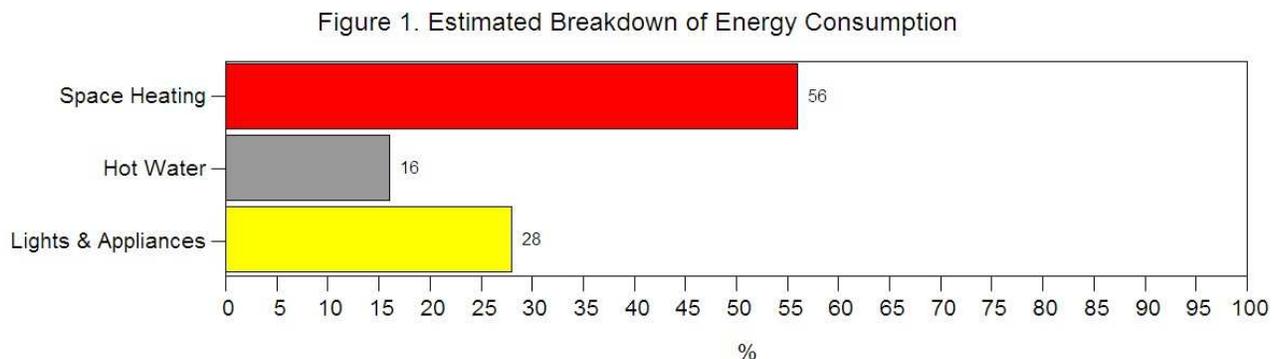
The EnerGuide rating system is a standardized method of evaluation that lets homeowners compare their house's energy efficiency rating to similar sized houses in similar regions. The EnerGuide rating considers the house's estimated annual energy consumption based on an in-depth evaluation of the house's characteristics such as location, size, equipment and systems, insulation levels, air tightness, etc. In addition, standardized conditions are used when calculating the rating in order to compare the efficiency of one house to another. These conditions include: a complete air change approximately every three hours; four occupants; a fixed thermostat setting of 21°C on main floors and 19°C in the basement; average hot water consumption of 225 litres per day; average national electricity consumption of 24 kWh per day; and regional weather data that is averaged over the last 30 years.

Figures 1 through 3 show the results of your energy evaluation based on the standardized conditions. The results may not entirely reflect your household since your actual energy consumption and future savings are influenced by the number of occupants, their day-to-day habits and lifestyles.

3. ENERGY CONSUMPTION

Houses lose heat to the outdoors during the heating season primarily through air leakage and conduction, such as the transfer of heat through the basement and exterior walls, ceilings, windows and doors (the 'building envelope'). Canada's demanding climate and modifications made to the house, such as drilling holes in walls for new wiring, pipes and lights, all play a part in reducing the efficiency of the building envelope over time. Houses need to be regularly maintained and upgraded to ensure greater energy efficiency, comfort and savings.

Figure 1 breaks down your house's estimated annual energy consumption for space heating, hot water and lights and appliances.



4. SPACE HEATING ANALYSIS

Figure 2 shows the estimated percentage of energy used for the space heating of your home.

- The right side of the top bar shows the percentage of energy you could save if you were to implement all of the upgrades recommended in this report, excluding changes to the space heating equipment. You could save up to 60 percent by performing all of the recommended non-space heating system upgrades.
- The right side of the bottom bar shows the percentage of energy you could save if you were to implement all of the upgrades recommended in this report, including any space heating system upgrades. You could save up to 87 percent by performing all of the recommended upgrades.

Figure 2. Estimated Percentage of Potential Energy Savings

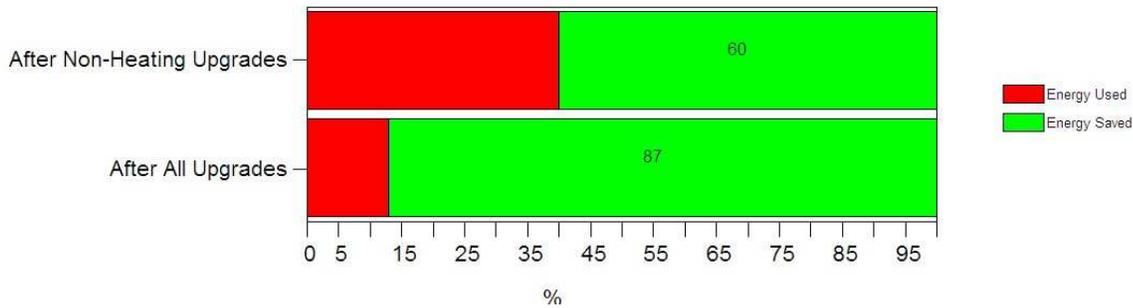
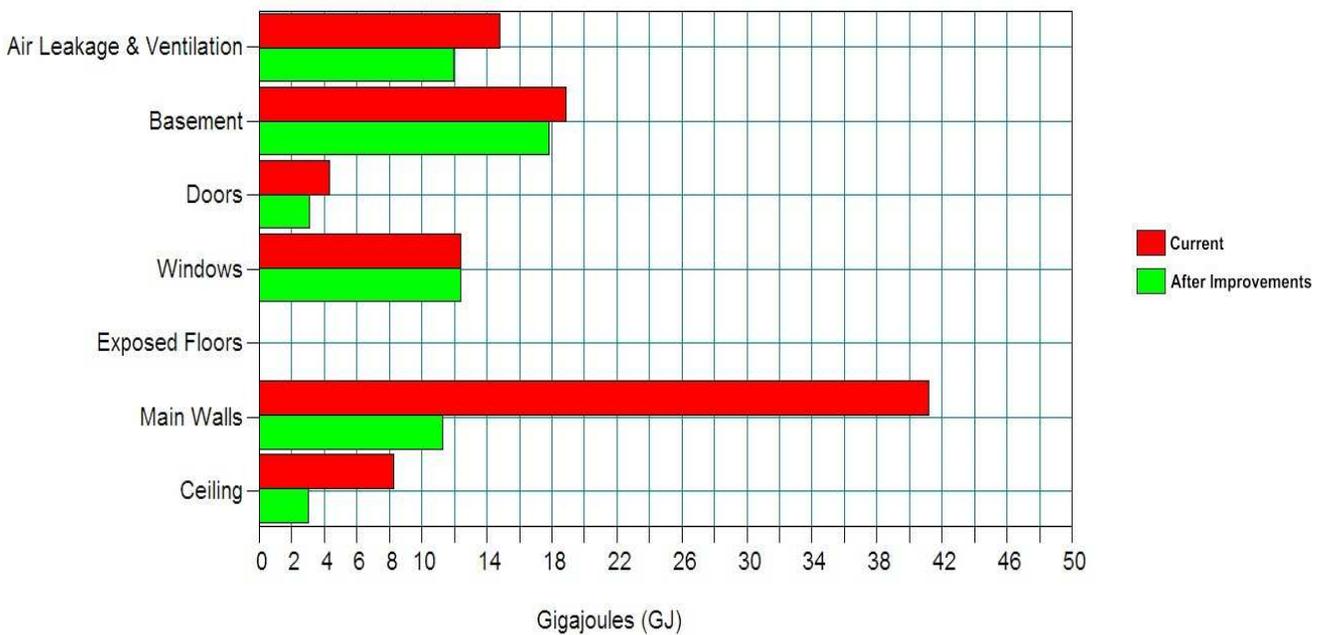


Figure 3 shows where the energy used for space heating is lost from your home. This energy is measured in gigajoules (GJ), where 1 GJ is equivalent to 278 kilowatt-hours (kWh) or 948,000 Btu.

The red bars show the areas where you are losing energy now. The longer the bar, the more energy you are losing. The green bars show the estimated energy loss after you complete your renovations. The larger the difference between the red and the green bars, the greater the potential for energy savings and comfort improvements.

Figure 3. Breakdown of Heat Loss through Building Envelope



5. RECOMMENDED ENERGY-SAVING MEASURES

Main Walls - Blown-In Insulation

If the main walls in your house have an empty wood-frame cavity, you can hire a professional insulation contractor to blow loose-fill insulation inside the cavity. Remember, however, that this cavity is usually only 90 mm (3 ½ in.) thick. If there is already insulation in the cavity, the benefits of blowing more insulation into it will likely be small and the contractor may have difficulty doing a good job. **Important to know:** Wood-frame houses with a brick veneer usually have a 25 mm (1 in.) drainage cavity between the bricks and the frame wall. This drainage cavity must not be filled or insulated and the drainage holes at the bottom of the brick on the exterior must not be plugged.

Blown-in cellulose fibre will more readily fill irregular spaces than other insulation materials. Cellulose can also significantly restrict air flow when blown to proper densities. The density should be no less than 56 kg/m³ (3 ½ lb./cu. ft.).

There are three ways of blowing loose-fill insulation into a wood frame cavity:

1. **From the inside:** This approach works best when combined with redecoration or renovation. Small holes of 15 to 50 mm (5/8 to 2 in.) are drilled through the interior wall finish and the insulation is blown directly into the wall. The holes must be completely sealed after the job is done. New paint or wallpaper may need to be applied to the walls, which should be impermeable.
2. **From the outside:** Most kinds of exterior siding can be drilled or lifted to permit access to the stud wall behind. For walls with brick veneer, single bricks can be temporarily removed. Each stud space will require two or more holes using this method, at least one at the top and another at the bottom. To avoid water entry if it rains, make sure the installer patches the holes section by section instead of leaving them all until the end.
3. **From the basement or attic:** This can be the easiest approach as long as the cavity is open from top to bottom. For this method, the contractor either drills holes in the bottom plate between each stud from the basement to blow in the insulation. Alternatively, the insulation is blown in from the attic.

All stud spaces in the wall should be filled. There should be allowances for windows, doors, fire stops, cross braces and other obstructions in the wall cavity. By knowing the size of the wall to be filled and the density of the application, you and the contractor can estimate and agree on the number of bags of insulation that will be needed. Remember that it's very important to seal all air leaks in the wall from the interior to prevent warm, moist air from entering the walls and creating moisture problems. Also keep your humidity levels low. Canada Mortgage and Housing Corporation recommends keeping humidity between 30 and 50 percent. A coat or two of low-permeability paint, such as latex vapour-barrier paint, applied to the inside surface of the wall provides a vapour barrier.

Recommendation:

I recommend that you have loose-fill insulation blown into the wood-frame cavity of your main walls and increase the insulation value in accordance with the section of this report entitled, "Your Home Energy Action Checklist".

Air Sealing

Reducing air leakage is usually the most cost-effective measure a homeowner can undertake; the leakier the home, the greater the savings! It is not unusual for air leakage to account for 35% of the heat loss in a home. In addition to reducing heat loss, air sealing improves comfort, protects the building structure and other materials from moisture damage, and reduces the amount of dust and noise that enters from the outdoors.

A blower door test was performed on your home to measure the amount of air leakage, and to identify the main air leakage locations. The blower door test results are shown on the first page of this report and are explained below.

The **Air Leakage Rate at 50 Pascals (ACH)** is the number of complete air changes per hour that occurs in your house when a pressure difference between the inside and outside of the home is set at 50 Pascals (Pa). A 50-Pa pressure difference simulates wind blowing at 56 kilometers per hour on your home. The higher the ACH, the leakier the house.

The **Equivalent Leakage Area (ELA)** represents the total air leakage area. It's like taking all of the air leakage areas (e.g., cracks, holes, etc.) in the home and putting them together to create one large hole in the building envelope. The larger the ELA, the leakier the house. An energy-efficient house might have an ELA as low as 258 cm² (40 square inches) while a leaky house may have an ELA of more than 3226 cm² (500 square inches)

Air Sealing Locations in Your Home

Listed below are the most common air leakage areas in a house. Leaks observed during the blower door test are noted. This list will help guide your air-sealing work:



- electrical outlets
 - electrical ceiling fixtures
 - electrical box and wire penetration
 - exterior pipe penetration
 - baseboard trims and mouldings
 - window frames
 - door frames
 - fireplace
 - chimney
 - attic hatch
 - basement header (rim joists)
-
- other: behind dishwasher
 - plumbing under kitchen and bathroom sinks
 - back door along the bottom
 - bathroom fan
 - outlets
 - inside edge of closets where there is no moulding around the door frame
 - attic hatch where the edges are unfinished
 - fireplace
 - under mantle
 - basement stairwell
 - beam in office
 - back door frame in basement
 - plumbing by washing machine
 - chimney in basement
 - stove pipe in basement
 - stove door (really leaky)
 - chimney
 - wood beam in basement living room
 - electrical pannel
 - plumbing under downstairs sink
 - pipe behind toilet

Air Sealing Options

Air sealing can be a do-it-yourself option. Another option is to hire a qualified, professional, air sealer who can locate and seal leaks in your home and likely do a more thorough job. This may be an important consideration if you want to air seal your house to meet a specific air leakage goal, and be eligible for a grant. Professional whole-house air sealing costs vary, depending on the size and complexity of the work.

Air Sealing Materials

Weatherstripping reduces air leakage by sealing gaps around moveable parts of windows and doors. Correctly installed, good quality weatherstripping is a cost-effective way to reduce air leakage. Check weatherstripping annually and replace worn materials before the cold weather sets in.

Caulking is used on the interior to seal small cracks and penetrations on the inside surface of your walls, ceilings and floors. Caulking is also used on the exterior to keep out rain, snow, wind as well as insects and rodents. Urethane foam is very good for filling larger joints and cavities.

For information on air sealing your home, consult NRCan's publications entitled *Air-Leakage Control, Improving Window Energy Efficiency and Keeping the Heat In*, and Canada Mortgage and Housing Corporation's *About Your House, and Renovating for Energy Savings* fact sheets.

Recommendation:

I recommend air sealing your home to achieve the air-leakage rate indicated at the beginning of this report, in the section *Your Home Energy Action Checklist*. You must meet or exceed the goal indicated to be eligible for an ecoENERGY Retrofit grant for air sealing. The results of the air sealing work will be measured at the time of your post-retrofit evaluation.

Solar Water Heaters

A typical, well-designed solar hot water system can reduce annual hot water heating costs by as much as 50 percent (by providing 1500 to 3000 kWh of energy per year).

There are several factors to consider before installing a solar water heating system, such as the average annual amount of sunlight available in your region, the orientation of your home relative to the sun, the availability of an approximately south-facing roof surface or wall on your home, and the hot water requirements of your household. The best orientation for the solar panels is south, south-west or south-east. In addition, there should be little or no shading caused by nearby buildings or trees. Other factors to consider are the size and type of the collectors, and the type, size and efficiency of the storage tank.

For more information on solar water heaters, including a list of installers and dealers, visit the Canadian Solar Industries Association's (CANSIA) web site at www.cansia.ca or call 613-736-9077.

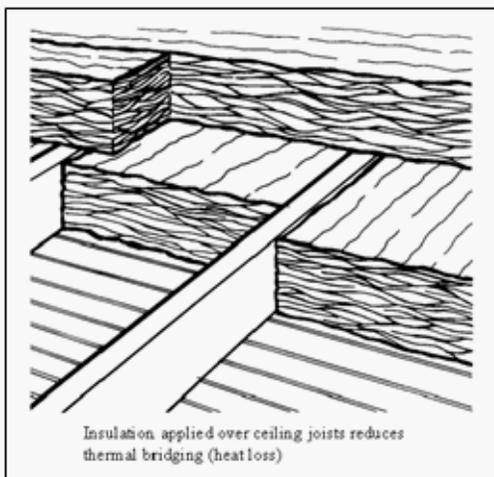
Grant Eligibility:

The installation of a solar domestic hot water heating system is eligible for an ecoENERGY Retrofit - Homes grant. Note that the solar collectors must meet the standard "CAN/CSA-F378-87 - Solar Collectors" to be eligible. Refer to the "list of accepted solar collectors" found at the ecoENERGY for Renewable Heat web site (www.ecoaction.gc.ca/heat). Note that only solar collectors listed under "Glazed Water Heating Solar Collectors - Flat Plate Collectors" and "Glazed Water Heating Solar Collectors - Evacuated Tube Collectors" are eligible for an ecoENERGY Retrofit - Homes grant.

Recommendation:

I recommend that you consider installing a solar water heating system that meets CSA standards.

Attic Insulation



In addition to reducing energy use, increasing the insulation level of your attic will keep your house warmer during the winter and cooler during the summer. Effective insulation and air sealing slow the movement of heat and air, and help prevent moisture accumulation in the attic.

When insulating attics, the importance of air sealing cannot be overstated. Before insulating, seal all openings and penetrations to stop interior air from entering the attic. Seal gaps around ceiling light fixtures, plumbing stacks, wiring, chimneys and the tops of interior walls. Install weatherstripping around the hatch or door, and use hooks with eye bolts or a latch to hold the hatch firmly against the weatherstripping.

Ensure that soffit venting is not blocked by the insulation. Baffles may need to be installed against the underside of the

roof along the soffits to ensure proper ventilation.

For more information on insulating attics, consult NRCan's publication entitled *Keeping the Heat In*, Chapters 1-4, and Canada Mortgage and Housing Corporation's *About Your House* and *Renovating for Energy Savings* fact sheets.

Grant Eligibility: Attic insulation upgrades are eligible for an ecoENERGY Retrofit – Homes grant. The grant amount differs according to the existing insulation value and the total insulation value achieved. Information on the eligibility requirements when insulating attics can be found in the brochure entitled *Retrofit Your Home and Qualify for a Grant!*

Recommendation:

Increase the insulation value of your attic to the insulation value noted in the section of this report entitled 'Your Home Energy Action Checklist'.

Door Upgrades

Old and ill-fitting exterior doors can contribute significantly to heat loss and drafts. Heat escapes through the

door, the frame and other materials. Air leaks through the door-window seals and between the door and frame and also the doorframe and the rough opening.

Energy-efficient exterior doors reduce heat loss, save energy and improve comfort. Metal and fiberglass insulated doors, for example, are far more efficient than hollow or solid wooden doors. High-quality, durable weatherstripping and door hardware are also crucial to ensure energy-efficient doors, as well as the proper installation of the door and the air sealing around the doorframe.

For information on energy-efficient doors, consult NRCAN's publication entitled *Consumer's Guide to Buying Energy-Efficient Windows and Doors*. For information on ENERGY STAR®-qualified windows, doors and skylights, go to www.energystar.gc.ca.

Grant Eligibility: The replacement of exterior doors with models that are ENERGY STAR-qualified is eligible for an ecoENERGY Retrofit – Homes grant. However, you must choose models that are ENERGY STAR-qualified for your climate zone.

Recommendation:

Replace selected exterior doors with ENERGY STAR-qualified models that match your climate zone. Refer to the section of this report entitled 'Your Home Energy Action Checklist' for information on your climate zone and the number of doors recommended for replacement.

Air-Source Heat Pumps

Air-source heat pumps, which include air-to-air and air-to-water heat pumps, extract heat in the air from outside and transfer it to a distribution system in the house during the heating season.

Different terminology is used for the efficiency ratings of heat pumps. For example, air-source heat pumps have seasonal heating and cooling ratings. The heating rating is the Heating Seasonal Performance Factor (HSPF), while the cooling rating is the Seasonal Energy Efficiency Ratio (SEER). However, in the manufacturers' catalogues you may still see Coefficient of Performance (COP) or Energy Efficiency Rating (EER) ratings. COP is used to rate cooling or heating efficiencies and EER only rates the cooling efficiency. The higher the rating, the more energy efficient is the heat pump. ENERGY STAR® qualified heat pumps are among the most energy efficient in the marketplace.

For more information on air-source heat pumps, refer to the NRCAN publication entitled, *Heating and Cooling with a Heat Pump*.

Grant Eligibility: ENERGY STAR qualified air-to-air and air-to-water heat pumps are eligible for an ecoENERGY Retrofit - Homes grant for the heating system. These air-source heat pumps are also eligible for an additional ecoENERGY grant for the cooling system, providing the heat pump replaces an existing central air conditioner. For more information, refer to the NRCAN publication entitled, *Retrofit Your Home and Qualify for a Grant!*

Recommendation:

I recommend that you consider installing an ENERGY STAR® qualified air-source heat pump to heat and cool your home.

Water Conservation

Water conservation is an important part of a home energy saving plan. Whether you are on municipal water or a well, water conservation can lessen your impact on the environment by reducing the energy use associated with water treatment and delivery, including the electricity used for pumping water and sewage.

Toilet usage can account for approximately 30 percent of indoor water use. The amount of water used depends on several factors: the flush volume, how often the toilet is flushed and the toilet's condition (adding dye to the tank water can reveal a leaky flush valve if the colour shows up in the bowl without flushing). For example, if you replace a toilet that flushes with 13 litres of water with a 6-litre model, you will save more than half of the water you and your family use. And additional water economy can be achieved by installing a dual-flush toilet designed to save about 25 percent more water than a 6-litre toilet.

Grant Eligibility: The replacement of existing toilets with low- or dual-flush toilets is eligible for an ecoENERGY Retrofit – Homes grant. New toilets must meet three performance criteria for water savings sustainability and long-term water saving performance. The new models must:

1. be rated at 6 litres per flush or less;
2. meet the Los Angeles Supplementary Purchase Specification (referred to as SPS); and
3. have a flush performance of 350 grams or more.

Information on qualified makes and models is available at www.veritec.ca. Click “Reports” and download the most recent version of the MaP report. Go to the appendix with the list of toilets sorted by performance.

Important: To ensure compliance, you must keep sufficient documentation on the make and model number of the replacement model(s). Show this information to the energy advisor during your post-retrofit evaluation.

Recommendation:

When replacing your toilet(s), purchase low- or dual-flush models that meet the requirements described above.

6. ENERGY-SAVING TIPS

Although these actions are not eligible for an incentive, they will help you save energy and money:

- Install and use a programmable electronic thermostat (set the heating temperature to 20°C while you are at home and 17°C at night and when you are away). For each degree of setback, you can save up to 2 percent on your heating bills.
- When replacing lighting, appliances, electronics and office equipment, look for ENERGY STAR® qualified products. ENERGY STAR® qualified products use less than half as much energy in standby mode (i.e. when they are turned "off"). For more information, go to <http://energystar.gc.ca>. You can also look for the EnerGuide label to help you select the most energy-efficient model.
- Replace your light bulbs with energy-efficient ones, such as compact fluorescents. They last longer and reduce electricity consumption.
- Insulate the first two metres of the hot and cold water pipes with insulating foam sleeves or pipe wrap insulation. By doing so you will save on your water heating costs and will reduce your water consumption. Besides saving energy, water will arrive at the faucets warmer or colder. Insulating cold water pipes will also avoid condensation from forming on the pipes. This prevents dripping on the ceiling finish or the basement floor. For a fuel-fired water heater, maintain a 15-centimetre (6-inch) clearance between the water piping insulation and the vent pipe.
- Install an ENERGY STAR® bathroom exhaust fan in both bathrooms.
- Install low-flow showerheads (rated at less than 9.8 litres per minute [L/min]) and faucet aerators.
- Plug your home office equipment into a power bar that can be easily turned off when equipment is not in use. Refer to the fact sheet *Standby Power - When "Off" Means "On"* for information on standby losses.

7. INFORMATION RESOURCES

Home Energy Efficiency

Natural Resources Canada publishes a variety of publications that can help you improve the energy efficiency of your home. These publications are available online at oee.nrcan.gc.ca/publications or by calling the order desk at 1-800-387-2000.

Renovation Publications

Canada Mortgage and Housing Corporation (CMHC) publishes a large number of renovation planning fact sheets that are available at no cost. There are also some excellent in-depth publications for sale. Visit cmhc-schl.gc.ca or call 1-800-668-2642 to order your material of interest.

Hiring a Contractor

Before you have any work done, request quotations in writing from professional contractors and obtain a written contract. CMHC has a very useful fact sheet on this subject, *Hiring a Contractor*, which includes a draft contract. Visit cmhc-schl.gc.ca or call 1-800-668-2642 to order.

Mold

If you suspect mold growth in your home, it is recommended that the mold damaged area(s) be cleaned thoroughly or removed and properly disposed of. To control and reduce the potential for mold growth, maintain indoor humidity at appropriate levels, and remedy water infiltration and leakage issues. Refer to the CMHC fact sheet *About Your House: Fighting Mold - The Homeowner's Guide* for information on proper mold identification and cleaning procedures. Visit cmhc-schl.gc.ca or call 1-800-668-2642 to order.

Humidity Control

A relative humidity (RH) level of between 30 and 55 percent is recommended in the home. If you have a humidifier or dehumidifier, ensure that it is regularly cleaned and maintained, and that the humidistat is set at an appropriate humidity level. You can use a hygrometer to measure relative humidity and the CMHC fact sheet *Measuring Humidity in Your Home* gives good advice. In addition, dehumidifiers can help reduce moisture levels especially in basements.

Vermiculite and Renovation

Older vermiculite insulation installed in homes may contain amphibole asbestos. If the insulation is in the walls or attic spaces and is not disturbed, it poses very little risk to the health of the occupants. However, if vermiculite is found during a renovation, or if you suspect it might be in your home and you plan to renovate (including insulation or air sealing work), contact professionals who are qualified to handle asbestos before you proceed with the renovation. For a listing of qualified professionals, look in the Yellow Pages™ under 'Asbestos Abatement & Removal'. For information on vermiculite insulation that contains amphibole asbestos, refer to the Health Canada fact sheet *It's Your Health - Vermiculite Insulation Containing Amphibole Asbestos*. Visit hc-sc.gc.ca/iyh-vsv/prod/insulation-isolant_e.html or call Health Canada at 1 800 443-0395 to order a copy.

GET STARTED TODAY!

Now that you have the tools to improve your home's energy efficiency, you can look forward to enjoying the added comfort of your ecoENERGY improved home. Not only will you benefit from increased comfort, you will also save on your energy bills year after year. And let's not forget your reduction of greenhouse gases!

Remember, you have up to 18 months to complete your retrofits and qualify for an ecoENERGY Retrofit - Homes grant.

A Note from your Energy Advisor

Hi Mr and Mrs X,

I modeled a number of potential upgrades for you to consider. The savings for each of these options are shown below in BTU's:

- Insulate exterior walls on the main floor: 26.5 Million BTU's
- Upgrade attic insulation to R 50: 5.7 Million BTU's
- Reduce air leakage as noted: 2.6 Million BTU's
- Replace 1 exterior door with an ENERGY STAR® qualified door: 1.1 Million BTU's
- Install an air source heat pump (I modelled 25,000 BTU's) and keep your existing gas furnace as backup: 37.4 Million BTU's
- Install a solar domestic hot water system: 8.7 Million BTU's

I hope this information is helpful. Good luck with your upgrades and let me know if you have any questions.

Take care,

Joy