

## Green Energy for Homeowners

## Why Green Energy?

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Using green energy is good for society. It reduces the emission of green house gases and pollutants; reduces our carbon footprint; improves the sustainability of our energy production; increases our national energy independence; and can save us money. Green energy prices are not subject to price fluctuations from global economics, political events, and market deregulation. Green energy supplies are unlimited whereas fossil fuels are limited in supply and their price will rise as they become scarcer. Green energy development and production produces jobs and stimulates the economy. Locally produced and used green energy minimizes the energy losses and equipment needed to transmit electricity over long distances. Using green energy benefits the environment and society.

### Focus

The focus of this issue of At the Source is green energy optimization for homeowners: How you as a homeowner, can benefit from green energy sources, increase the energy efficiency of your home, and reduce costs, especially when you retrofit.

By 'green energy' we mean clean, environmentally friendly, non-polluting energy, also referred to as sustainable or renewable energy. Green energy goes hand-in-hand with energy conservation and efficiency. Sources include solar, wind, water, geothermal, and biomass. How can you harness these sources, and use them to meet some or all of your energy needs? Could you heat your home, your swimming pool? Could they provide you with electricity?

In this introductory overview, we'll look at the green energy sources most likely available to you, and what they can do for you, for example reduce your domestic hot water heating costs by 60%. Then, help you assess your situation—including the importance of an energy audit and professional advice—show you briefly what one family did, and identify some financial incentives that may help you. Along the way, we have included resources you can use as a start for gathering more detailed information that will help you optimize your use of green energy.

# Green Energy Sources

Heat and electricity are the most common forms of energy we use in the home. Usual sources are purchased fuels, including oil, natural gas, coal, wood and electricity from a distribution grid, but other, often greener, sources may be available to the homeowner. Green, renewable energy is any sustainable energy that comes from the natural environment. Sources include the sun, the wind, flowing water, the earth itself, and some biological sources. For general information on these sources visit Natural Resources Canada's Canmet Energy website ([http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/about\\_us.html](http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/about_us.html)) and click on 'renewables'; the Pembina Institute's Re-energy site (<http://re-energy.ca/>); and the Ontario Sustainable Energy Association (<http://www.ontario-sea.org/>).

Let's look in more detail at each source and how we can use it.

## Passive Solar Energy

Homeowners can use the sun as an energy source passively or actively. To do so requires access to sunshine. A portion of your home or property must face south and not be in the shadow of trees or another building.

Passive solar is the most cost effective approach for maximizing the use of solar energy for Canadian homes. Passive solar heating occurs when sunlight passes through a window. No mechanical equipment is used other than normal building elements, such as walls, windows, floors, the roof, and exterior building elements. Landscaping can be used to control overheating by providing summer shade, windbreaks for winter winds, and surfaces that can create sun pockets and reflective surfaces for winter sun.

Once heat is collected inside, a well-insulated, airtight, building envelope helps prevent heat loss and allows the sun to provide more of the heat needed by the house. At Canadian latitudes, proper design of exterior overhangs and shading devices can optimize sun penetration in winter and shade during the summer. Home renovations, including new windows, provide an opportunity to capture more passive solar energy.

Solariums are a common and effective approach to gaining solar energy. They can be an attachment or integrated into the existing structure. To reduce temperature swings, and uncomfortable overheating, the solarium should include reasonable thermal mass to store heat, such as an insulated concrete floor slab with an exposed

concrete or tile finish, or a masonry feature wall. Water tanks, an excellent heat storage medium, can sometimes be incorporated into the design. To be effective as a solar collector, the solarium should be closed off from the main living area at night. Even high performance insulating glass has heat loss, so the large solarium glass area can lead to an uncomfortably cool space on a cold night.

For more information on passive solar heating, visit the Solar Energy Society of Canada's 'Discover Solar' page (<http://www.sesci.ca/node/63#how>).





## Active Solar Thermal

Active solar thermal systems convert solar radiation into heat, and use pumps or fans to transfer the heat to storage, or for distribution directly to its intended use. The key component of any active solar system is the solar collector, which absorbs the sun's radiant energy and transforms it into usable heat. The most common type of collector is the glazed, flat-plate panel for mid-range temperature applications, such as domestic hot water (DHW) and space heating.

On average, active solar systems can provide 50 to 60% of annual DHW needs. In most cases, solar energy will provide only some DHW needs in winter, but most of summertime's needs. Usually, the solar system is used as a pre-heater for city or well water going to the conventional DHW heater. Depending on your situation, choice of equipment, and applicable grants, rebates and tax credits, a DHW solar system can cost as little as \$2,049 plus GST. For example, the community-based West Toronto Initiative for Solar Energy (WISE) offers an affordable, solar hot water package which includes: a solar hot water unit, installation, and an ecoENERGY audit. To learn more, visit WISE (<http://www.ourpower.ca/community/wise>). With a well-designed and properly installed solar water heater, you can expect a simple payback of four to eight years.

Outdoor swimming pools can be entirely heated by solar systems. Plumbing can be connected directly to the pool's filtration system, minimizing added equipment. A solar pool heating system will pay for itself in two to three years compared to a gas-fired pool heater. Typical costs for an installed solar system are between \$2,700 and \$4,000, depending on site factors. For more information, visit the Canadian Solar Industries Association (<http://www.cansia.ca/Default.aspx?pageId=167173>)

For more information on active solar thermal, visit Natural Resources Canada ([http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/renewables/solar\\_thermal/how\\_it\\_works.html](http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/renewables/solar_thermal/how_it_works.html)), the Solar Energy Society of Canada (<http://www.sesci.ca/node/63#how>), and the Canadian Solar Industries Association (<http://www.cansia.ca/Default.aspx?pageId=167161>)

## Solar Photovoltaic Energy

Visible light can be converted directly to electricity by a photovoltaic (PV) or solar cell. Most PV cells are made from crystalline silicon. The small cells are linked to form arrays or panels. PV cells produce DC electricity, which in most cases, must be converted to AC for use. Many buildings generate most of their electrical needs from PV arrays including the Toronto Healthy House (<http://healthyhousesystem.com/toronto.html>), which gets 80% of its power from the sun.

Many homes and businesses have both a PV array and a connection to the electricity grid—

a grid tie system. The solar panels can provide all or most of the building's electrical supply during the day, and the grid supplies night time needs. In some cases, the panels make more electricity than is needed, and the excess is sold to the power company. The result: lower electricity bills, and in some cases a cheque! PV systems are cost effective for some special applications, especially in remote areas away from utility grids where you have to generate your own electricity. Recreational vehicles and boats are other common applications. For more information on PV systems, visit the Solar Energy Society of Canada (<http://www.sesci.ca/node/63#how>), and Re-Energy ([http://re-energy.ca/t-i\\_solarelectricity.shtml](http://re-energy.ca/t-i_solarelectricity.shtml)).

For typical home grid tie PV systems (without batteries for back-up power), producing between 2,037 kilo-watt hours per year (kWh/yr) and 3,056 kWh/yr, equipment costs from \$14,301 to \$19,878 before installation, taxes and rebates. Installation is about \$2,500 (<http://www.ecoaltenergy.com>). PV systems available through WISE, range from less than \$15,750 for a 1 kilo-watt (kW) system to over \$33,000 for a 3 kW system (turnkey system prices before rebates and grants). The installed cost per kW decreases as system size increases. Typical return on investment would be 8-9% annually every year for 20 years, based on the \$0.802/kWh rate for solar in Ontario's Feed In Tariff program (see below). Simple payback time would be 10 to 12 years before interest costs. For more information, visit WISE (<http://www.ourpower.ca/community/wise/178>). To encourage installation of solar photovoltaic systems, some jurisdictions offer a Net Metering Program which credits you for the electricity you produce, or a Feed In Tariff (FIT) Program to buy electricity from PV systems—including homeowners'—at a premium price for a guaranteed time. Depending on your situation, such an offer could, over the long term, pay for the system and then provide ongoing savings and income. In Ontario, most utility companies pay \$0.802/kWh for PV FIT electricity; about 14 times what you pay them for your electricity. For more on net metering, visit Pollution Probe's 'Net Metering' ([http://www.pollutionprobe.org/whatwedo/greenpower/consumerguide/c2\\_4.htm](http://www.pollutionprobe.org/whatwedo/greenpower/consumerguide/c2_4.htm)). Check with your local electricity supplier to see if it has net metering or FIT programs. In Ontario, visit the Ontario Power Authority's FIT program (<http://fit.powerauthority.on.ca/>).

For more information on solar energy, visit the Canadian Solar Industries Association (<http://www.cansia.ca/>) and Clean Air Foundation's Gosolar (<http://www.gosolarontario.ca/>)



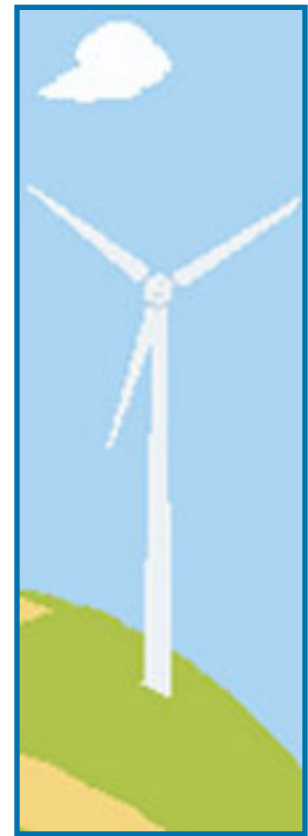
## Wind Energy

Electricity from wind energy is one of the fastest growing and most economical methods of electrical generation in the world. Kinetic energy from moving air is converted into electricity by

wind turbines. Using wind energy reduces the environmental impact of generating electricity because it requires no fuel and produces no pollution or greenhouse gases. For more information on wind energy, visit Natural Resources Canada ([http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/renewables/wind\\_energy.html](http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/renewables/wind_energy.html)) and the Canadian Wind Energy Association (<http://www.canwea.ca>)

While not suited for urban areas, small, highly efficient wind turbines are becoming popular as a source of electricity for rural homes and cottages. The installed cost comes close to that of putting up poles, power lines and other equipment necessary to connect to the electrical grid. The advantage is that the homeowner owns the generating equipment and is free from paying monthly electrical bills! To learn more, visit the Small Wind Energy website at (<http://www.smallwindenergy.ca/en/SmallWind.html>)

If you think a small wind turbine is for you, have a look at the “Small Wind Turbine Purchasing Guide” (<http://canwea.com/images/uploads/File/SmallwindturbinesFINAL.pdf>). Check with your local electricity supplier for wind power Feed In Tariff (FIT) rates. In Ontario, most utility companies pay \$0.135/kWh for wind power FIT electricity.



## Water Energy

Rivers and streams are among nature’s most powerful forces. Humans have long appreciated the power of moving water, and have been using it for thousands of years. One of the most environmentally friendly ways to make electricity is with a micro-hydro turbine. A turbine as small as 10 centimetres in diameter can be used to power a variety of machines, including electrical generators, pumps, fans, and more. Small-scale hydro systems require a supply of high-pressure water but are relatively cheap and easy to install. Small-scale hydro can bring the benefits of electricity to rural dwellers and remote communities without the problems and costs associated with fossil fuels or large dams.

Check with your local electricity supplier for water power Feed In Tariff (FIT) rates. In Ontario, most utility companies pay \$0.131/kWh for water power FIT electricity.

To learn more about water energy, visit Re-energy ([http://re-energy.ca/t-i\\_waterpower](http://re-energy.ca/t-i_waterpower)

[shtml](#)) and Natural Resources Canada’s Small Hydropower ([http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/renewables/small\\_hydropower.html](http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/renewables/small_hydropower.html)). For examples of small hydro view Homepower (<http://www.homepower.ca/>) and Natural Resources Canada’s Micro-Hydro Buyers Guide ([http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/renewables/publications/microhydro\\_systems.html](http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/renewables/publications/microhydro_systems.html))



## Earth Energy

Earth, geothermal, or ground source energy is available to most home owners. The temperature of the soil below about two metres remains constant regardless of the weather or season. In most of southern Canada, soil temperatures at this depth hover between 5 and 10° C. The difference between air and deep soil temperatures can be used for heating and cooling very efficiently with a ground source heat pump, also called a geothermal heat pump. A heat pump works the same way your refrigerator does. An essential part of the heat pump is the network of tubes buried deep in the soil near the home, either in trenches or a bore hole.

By reversing the flow of the refrigerant, the heat pump system can cool your house in summertime. Heat collected from inside the house is released back into the cool soil, resulting in a highly efficient air conditioning system for the home. A ground source heat pump requires some electricity to run the compressor, but provides the equivalent of three times the kW of electrical heat for every kW supplied. In an efficient, well-insulated home, this needed electricity could be easily supplied by a rooftop solar panel. When earth energy meets 100% of heating needs, it saves as much as 70%, compared to electric resistance heating. Used for cooling, earth energy usually operates about 35% more efficiently than even EnergyStar-rated air-conditioning technology. If you have enough property, or access to a natural water body, the earth could provide a significant part of your home heating and cooling needs. For more information on ground source energy, visit Re-energy ([http://re-energy.ca/t-i\\_otherclean.shtml](http://re-energy.ca/t-i_otherclean.shtml)) and the Canadian GeoExchange Coalition (<http://www.geo-exchange.ca/en/>)

## Biomass Energy

Biomass energy comes from wood, straw, biological waste products (e.g. manure), and other natural materials that contain stored energy. The stored energy can be released by burning the material directly or feeding it to micro-organisms that use it to make biogas, a form of natural gas. Energy from biomass is used around the world, for everything from cooking and heating to generating electricity. For more information, visit Re-energy ([http://re-energy.ca/t-i\\_biomassenergy.shtml](http://re-energy.ca/t-i_biomassenergy.shtml))

For homeowners, especially rural ones, the most readily available source of biomass energy is wood, a carbon neutral fuel. It is renewable and produces no additional greenhouse gases when harvested sustainably. Combustion and catalytic stoves that are modern, efficient and relatively clean burning are readily available. USEPA approved appliances reduce pollutants by up to 90%,



and give the same heat with up to one third less wood. To learn more, visit Environment Canada's Residential Wood Heating site (<http://www.ec.gc.ca/cleanair-airpur/default.asp?lang=En&n=50E7D551-1>) and the USEPA's USEPA's Burn Wise (<http://www.epa.gov/burnwise/>).

You can use green energy sources in combination with one another or with conventional energy sources. For example, thermal solar can be used to heat, or preheat domestic hot water (DHW) which may be heated by gas, oil or electricity. Thermal solar may be used for radiant floor heating together with a boiler fired by wood, gas, or oil. For an example of a home using combined passive solar, photovoltaic (PV), solar thermal and earth energy visit EcoTerra ([http://www.solarbuildings.ca/en/projects\\_3](http://www.solarbuildings.ca/en/projects_3))

Using more energy from green sources will reduce pollution and the effects of global warming. There's no shortage of green energy, but can you harvest it for your home? You'll need to assess your situation.

## Assessing Your Situation

The form and amount of green energy available to you depends on your situation. Do you live in the city or the country, a house of a high rise? Before you decide on how you might optimize your use of green energy, you need to consider your situation, and get professional advice. Here are some questions and resources to get you started.

**How long do you intend to stay in your home?** If you plan to move in the next 10 years, a major investment in green power, such as a PV system or wind turbine, may not be for you, unless it increases the value of your property. You may be better off with a solar domestic hot water (DHW) system, buying green electricity or green power certificates (see below), putting up thermal blinds, and adding insulation, caulking and a programmable thermostat.

**What can you afford?** Green energy need not be expensive. A new, energy efficient window (i.e. passive solar) can be relatively inexpensive, likely under \$1,000 installed. A thermal solar DHW system can cost as little as \$2,152. Think long term. The cost of the energy you buy is almost certain to continue rising. The cost of the green energy you harvest from sun, wind, water, and earth, will not. Government grants, rebates, and tax credits (mentioned below) can help you significantly. In some cases, loans may be available. For example, the Alternata GreenSaver Improvement Loan (<http://www.greensaver.org/en/home-energy-audits/GreenLoans/>)

### **Where do you live, and how big is your lot?**

If you live in the city and have a small lot, it may be difficult to use ground source energy. Solar thermal or photo voltaic (PV) would be more accessible. If you're in the country with a large lot, ground source or wind may work well for you.

If you live in an apartment or condominium, or you can't harvest green energy yourself, you can buy it from companies such as Bullfrog Power (<http://www.bullfrogpower.com/>), a provider of 100% green electricity in Ontario, Alberta and British Columbia. Some local utilities, such as Energy Ottawa (<http://www.energyottawa.com/>) and Oakville Hydro ([http://www.oakvillehydro.com/green-power\\_residential.asp](http://www.oakvillehydro.com/green-power_residential.asp)) offer green electricity. A good place to start when looking for green electricity is Pollution Probe's 'How to Buy Green Power' ([http://www.pollutionprobe.org/whatwedo/greenpower/consumerguide/c2\\_1.htm](http://www.pollutionprobe.org/whatwedo/greenpower/consumerguide/c2_1.htm)). For more on buying green power, see the Spring 2008 edition of At the Source (<http://www.c2p2online.com/>) click Resources, then At the Source, and Available Issues.

If you live in an apartment or condo-

minium, your building owner or condominium corporation could consider buying solar thermal energy for the building. Green, solar thermal energy is available in Ontario from Mondial Energy Inc. (<http://www.mondial-energy.com/>).

**How close is the electrical grid?** If you are building or renovating a property that is remote from the electrical grid, it may cost less to provide your own green power than pay to connect to the grid.

**Which way is south, and do you have sun?** To use solar energy, you need access to sunshine. A portion of your home or property must face south and not be in the shadow of trees or another building. If you have a south facing roof with room for a couple of solar thermal panels or a photovoltaic (PV) array, or if the south side of your house is suitable for a solarium, you're in luck! If you have sunny space on your lot or a suitable out building (barn, drive shed, workshop), you may be able to optimize the placement of a larger, multi-panel, solar thermal and or PV system and harvest even more energy.

**Do you have space for a wind turbine, and enough wind?** To use wind energy, you require space for a wind turbine, which should be mounted at least 9 metres above the ground on its own mounting. Also, you need a good source of steady wind.

**Do you have access to flowing water?** If you have access to a stream with an adequate and reliable flow and head of water year round, micro-hydro may be for you.

**What local restrictions exist?** What permits do you need? Check with your local and provincial government and their agencies about restrictions and what permits or approvals you may need. You may need a building permit to put up your wind turbine, electrical approvals

## How green can you go?

You may be able to produce 100% of your energy needs from green sources and get off the grid. Others have done it! Alternately, you can stay connected and supply energy to the grid or become a Net Zero Energy Home (NZH). A NZH is capable of producing, at minimum, an annual output of renewable energy that is equal to the total amount of its annual consumed/purchased energy from energy utilities. To learn more about NZH, visit the Net Zero Energy Home Coalition (<http://www.netzeroenergyhome.ca/>) and for an example, visit Riverdale Netzero Home Project (<http://www.riverdalenetzero.ca/Home.html>)

If you are thinking of getting off the grid, or building and not connecting to it, two books by William H. Kemp, Aztext Press ([www.aztext.com](http://www.aztext.com)) that will help you are:

- *The Renewable Energy Handbook, a guide to Rural Energy Independence, off-grid and sustainable living*, which shows you how to stretch your energy dollars while powering your home with clean, dependable, renewable energy
- *Smart Power: An urban guide to renewable energy and efficiency*, which will help you to better energy management and renewable energy production.



for a PV system, or approval to use a stream.

**How old is your heating system, your water heater, and what might offer you the best return?** If your heating system is near the end of its life, ground source heat might be a wise choice. If you need a new water heater, a new dual-coil tank with solar thermal pre-heater is a good idea. Need a new pool heater or thinking of adding one? A low cost, seasonal, solar thermal system is a good choice.

**How old is your home?** If your home is older, and you haven't already done so, reducing your energy losses with added insulation, new windows and doors and air-leakage control (caulking and sealing) should be the place to start. Using less energy and keeping what you have offers immediate savings and increased comfort. Conservation and energy efficiency go hand in hand with green energy and will increase the return on your green energy investment. To learn more about energy conservation and efficiency, visit Natural Resources Canada's Office of Energy Efficiency (<http://oee.nrcan.gc.ca/english/>)

A professional, home energy audit will show you where to conserve energy and what to do to make your home more energy efficient. Even for



## The Energy Audit and Specialist Advice

Before you start a green energy project, a professional energy audit will help you get the biggest bang for your buck. Importantly, it will ensure you remain eligible for government grants and rebates, such as those from the ecoENERGY Retrofit Program, but only if the audit is done before you start work. Discuss with potential auditors what you have in mind, especially green energy possibilities. Many auditors offer different types of audits and may expand or adjust the scope of the audit to cover green energy options, or reflect your green energy intentions in their advice and recommendations. The auditor's written report will review your overall energy consumption, your space heating and heat losses, recommend specific energy saving measures and give you energy saving tips as well as a list of information resources.

For a list of licensed Canadian organizations providing energy assessments and audits in your area, visit Natural Resources Canada ([\[sonal/new-home-improvement/contact-advisors.cfm?attr=4\]\(http://oee.nrcan.gc.ca/residential/per-sonal/new-home-improvement/contact-advisors.cfm?attr=4\)\) and enter the first three digits of your postal code. Once you have completed your project, the auditor will do a follow-up audit and, in most cases, submit your grant applications to the government. The follow-up audit must be done and your application submitted within 18 months of the initial audit.](http://oee.nrcan.gc.ca/residential/per-</a></p></div><div data-bbox=)

For more specific professional advice on harvesting green energy and a feasibility assessment of what you might do and how you might do it best, contact a green energy consultant, supplier, or installer. The following websites may help you find one in your area:

- Canadian Solar Industries Association (<http://www.cansia.ca/>) use the Member Industry Directory
- Canadian Wind Energy Association (<http://www.canwea.ca>) click on About Us, then Members Directory
- Canadian GeoExchange Coalition (<http://www.geo-exchange.ca/en/>) click on "Looking for an accredited professional?"
- Toronto Solar Neighbourhood Initiative (<http://www.solarneighbourhoods.ca/>)



- Our Power (<http://www.ourpower.ca/>) for solar bulk buying groups (Toronto, Aurora, Waterloo, Guelph, and other Ontario communities)

Also, ask around, word of mouth from satisfied customers is another good way to find the services you need.

Costs for green energy continue to drop, and thermal solar usually offers the best return and quickest pay back. Let's look at one Canadian family's recent experience.

## A Greener Upgrade

Peter and Michele Fischer have lived in their 1927, brick, 133.59 square metre Toronto home for 25 years. Over the years, their home improvements have included new energy efficient windows, thermal blinds, added wall and attic insulation, and a one-story rear addition. But their space and domestic hot water (DHW) heating systems were much the same as when they moved in. Their space heating consisted of cast iron radiators and an oil-fired boiler (72% efficient) which was over 40 years old and long past its expected life. Their oil tank was the same age as their boiler and of growing concern to the serviceman-TSSA inspector. Also, the Fischers found few insurers would cover oil tanks older than 20 years. "We decided it would be prudent to examine boiler replacement and heating improvement options before the boiler failed, and we were forced to replace it on short notice—likely in mid January when it's -25°C.", says Peter Fischer. The DHW tank presented a different situation. The 273 L size and flat-rate, electric billing were based on the needs of four people, but the Fischers no longer had two children at home. "We were paying for more hot water than we needed, and rates were rising", notes Peter.

What were the Fischers to do? Stay with oil and electricity, switch to gas, consider greener ground source heating and cooling, and what about solar thermal? The Fischers gathered information from various websites and manufacturers, sought advice from several contractors and an equipment supplier, and looked at different installations. They learned that solar thermal can typically reduce DHW energy costs by 40 to 50%, offers a very good return on investment, has low maintenance costs, and produces no green house gas emissions.

The Fischers decided to switch to gas for space heating with solar thermal, supplemented by gas, for DHW heating. As part of their decision-making process, the Fischers considered other improvements that would make their home more comfortable and result in ongoing, energy and cost savings. They decided to install radiant floor heating under the first floor between the joists, replace some over-sized radiators with newer smaller ones, insulate the dining room wall and put in an energy efficient window, and replace the badly worn original oak flooring in the living, dining rooms, and hallway.

Before any work was started, the Fischers had an ecoENERGY audit of their home. The auditor evaluated the energy efficiency of their home and provided a numerical efficiency rating, specific recommendations, and general tips for improving energy efficiency. The Fischers' house rated 54 on a scale of 0 to 100. For a Canadian house of the same age, average energy efficiency is

42, and highest efficiency is 83. To achieve a rating of 65, the auditor recommended they replace their boiler with an ENERGY STAR® version (85% or higher AFUE), install a solar thermal DHW system that meets CAN/CSA Standards and increase their attic insulation to RSI 8.8 (R-50). The Fischers carried out all three recommendations. The follow-up energy audit rated their house at 68, an increase in energy efficiency of 26%.

For their new equipment, they chose a high quality gas-fired condensing boiler (AFUE 94%), a 300 L dual coil DHW tank, two flat-plate solar thermal collectors with pumps and control unit for the solar system. Grants and rebates covered 14.2%\* of the basic project—boiler, solar with DHW tank, and attic insulation.

What have the results been after two years with their new space and DHW heating systems?

- The solar system heats 61% of their hot water.
- Total energy use for space and DHW heating has been reduced by 20.9%.
- Greenhouse gas emissions have been reduced by 7.2 tonnes per year.
- Purchased energy use for space and DHW heating has been reduced by 34.1% and energy costs have been reduced by 63% compared to 2006-2007.
- Energy costs have been reduced by 74% based on gas, oil and electricity costs one year after installation (June 2008).
- The expected payback period for the new boiler, solar, and insulation is 14 to 15 years and the return on investment has been 7.2%/yr based on energy retrofit grants and rebates from Federal and Provincial governments, rebates from Enbridge Gas, and June 2008 gas, oil and electricity rates\*.
- The expected payback period for the solar system (without DHW tank) is 8 years.

\*Note that since the Fischer's completed their retrofit work, some Federal and Ontario retrofit grants and rebates have doubled in value which would reduce the payback period and increase the return on investment.

“We look at what we've done as a long term investment in our home and comfort. We're really happy with the results. Who else would pay us 7.2%, and keep us warm and comfortable?” comment the Fischers.

Although green energy sources can be more expensive than traditional ones, and often involve longer term investments, they can reduce your costs and save you money. Actual costs, returns, and savings will depend on your situation, but there are financial incentives to help you.



## Financial Incentives and Help

These websites have information on grants, rebates, tax credits, and incentives that encourage energy efficiency, and green energy production and use. They will help you reduce the cost of your project, or may help you finance it.

The Federal government's ecoENERGY Retrofit Program (<http://oee.nrcan.gc.ca/corporate/retrofit-summary.cfm?attr=0>)

Ontario Home Energy Audit and Retrofit Rebate Programs ([http://www.homeenergyontario.ca/stripes\\_en.asp](http://www.homeenergyontario.ca/stripes_en.asp))

Home Renovation Tax Credit (<http://www.cra-arc.gc.ca/gncy/bdgt/2009/fqhmrvtn-eng.html>)

Ontario Solar Energy Systems Rebate Program (<http://www.rev.gov.on.ca/english/refund/sesr/>)

Ontario Wind, Micro Hydro-Electric and Geothermal Energy Systems Rebate (<http://www.rev.gov.on.ca/english/refund/windgeo/index.html>)

Clean Air Foundation, Gosolar, Incentives ([http://www.gosolarontario.ca/en/incentives\\_gs.asp](http://www.gosolarontario.ca/en/incentives_gs.asp))

Ontario Power Authority, Feed In Tariff (FIT) program (<http://www.powerauthority.on.ca/fit/>)

Alterna Savings GreenSaver Improvement Loan (<http://www.greensaver.org/en/home-energy-audits/GreenLoans/>)

Citizens Bank of Canada, Green Mortgage, (<https://www.citizensbank.ca/Personal/GreenMortgage/?id=gfo>)

RBC Energy Saver Mortgage or Loan, (<http://www.rbcroyalbank.com/RBC:SbV0rY71A8YANEC4Fpw/renovating/eco-renovation.html>)

For more information on incentives across Canada for solar systems, visit the Canadian Solar Industries Association (<http://www.cansia.ca/Default.aspx?pageId=139888>)

For more information on incentives across Canada for geothermal energy, visit the Canadian Geo-Exchange Coalition (<http://www.geo-exchange.ca/en/>) pull down the 'Information Centre' menu, click 'Financial support and grants'.

Also, check with your local electricity supplier for green power incentives, net metering and FIT programs, and green, sustainable electricity.

## Additional Resources

In this issue of *At the Source*, we have introduced you to the potential of green energy for your home. An internet search will yield many informative green energy sites. Your library will likely have books on green renovation and sustainable energy. Larger bookstores are sure to have a home building and renovation section with books on green building, energy efficiency, and sustainable energy. Check out the Canada Mortgage and Housing Corporation's publications, EQuilibrium™ Sustainable Housing Demonstration Initiative (<http://www.cmhc-schl.gc.ca/en/co/>) and the Office of Energy Efficiency's useful information and publications (<http://oee.nrcan.gc.ca/english/>). For conservation tips, resources and news, visit powerWISE (<http://www.powerwise.ca/>).

As a homeowner, green energy—sun, wind, water, and earth— is there for you to harvest. Why not optimize your use of green energy, increase the energy efficiency of your home, and reduce your costs, especially when you renovate your home?

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