



SOLAR COLWOOD

Solar Colwood aims to move a whole community toward energy conservation and renewable clean energy. The goal is to retrofit 1,000 homes with solar hot water heating over the next three years, as well as demonstrating other clean energy options.

Solar Colwood takes action to create jobs, reduce energy costs for homeowners and businesses, and reduce greenhouse gas emissions. It is one way in which the City of Colwood is implementing its award-winning Official Community Plan.

The program is supported through a \$3.9 million grant from **Natural Resources Canada**, as well as financial and technical contributions from our many partners: **T'Sou-ke First Nation, Royal Roads University, Horizon Technologies, SolarBC, League Assets, the Province of British Columbia, BC Hydro and Terasen Gas**, as well as the **WestShore Chamber of Commerce**. Agreements with other partners are being finalized and will be announced at a future date.

Read on ...

INSIDE:

Energy saving home retrofits
Clean energy demonstration projects
Community education and outreach
Research, monitoring and reporting
Electric vehicle charging infrastructure

From its clean energy demonstration projects to home retrofits, **Solar Colwood** is as much about saving money as it is about reducing energy and emissions. *"We are aiming to help retrofit 1,000 Colwood homes with solar hot water and other clean energy upgrades over the next three years,"* says Mayor David Saunders. *"Solar Colwood incentives will cover a significant portion of the installation cost of solar hot water heating. Our mission is to help residents and business owners achieve significant savings on their energy bills at a time when costs are on the rise."*

SolarColwood: Project fuels shift to clean energy

Solar Colwood consists of four 'on-the-ground' components, together with significant supporting elements crucial to program success.

1 Home Retrofits: Energy Efficiency and Renewable Energy

Reducing greenhouse gas emissions from existing buildings plays a pivotal role in reducing community emissions. In Colwood, the buildings account for about 29% of the community greenhouse gas emissions, and most of our buildings are family homes.

Hot water heating is a sizeable component of home energy use in this part of British Columbia, where heating/cooling bills are lower than in many other parts of the country. Residents can save money by converting to solar thermal hot water heating systems. Results from the solar thermal installations in homes in the T'Sou-ke Nation estimate homeowners save up to 30% per year on their energy bills; and as much as 50% savings when combined with a range of other energy conservation measures.



Diagram of Solar Hot Water system

Is your home right for solar hot water?

A couple of quick questions from our project partners at SolarBC ...

Does your home have at least 6 square metres of south-facing roof space?

Do you have zero or limited shade from 10am to 4pm on the south-facing part of your roof?

Solar Colwood aims to bring these same savings home to the residents of our community by retrofitting 1,000 homes (about one-sixth of the city's housing stock) with solar hot water heating and other clean energy/energy saving retrofits over the next three years.

The program is entirely voluntary. Homeowners and businesses choosing to join the program will receive financial incentives to reduce the cost of installations, as well as direct support and advice from Solar Colwood's program coordinator. Financing—to enable the cost of installations to be paid over time from energy cost savings—will also be available.

The solar thermal program is part of a broader effort to reduce energy use by, and emissions from, Colwood homes. The first stage will be for each home to have an energy assessment that will identify the potential for solar thermal, as well as identifying other actions the homeowner can take to increase energy efficiency (such as weather-stripping, attic insulation, hot water tank and piping insulation, LED lights, smart controls and appliances, or better windows). Solar Colwood will also provide an opportunity for one-on-one conversations with homeowners regarding the benefits of energy conservation (such as switching to more efficient appliances, or having a power bar to turn off computers/printers/peripherals).

Solar Colwood will also explore other energy-saving and/or clean energy technologies, such as ductless split heat pumps (see next page). This will be an opportunity to examine which technologies provide the best business case for various circumstances. For example, a home in a shaded forested area may be a poor candidate for solar hot water heating, but well situated for other beneficial energy retrofits.

Smart technologies that save money

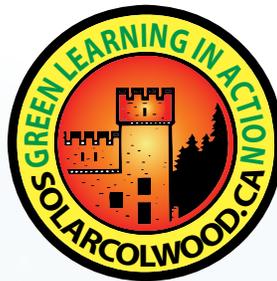
Solar Colwood homes will be retrofitted with Smart Meters (as part of BC Hydro's province-wide installation program) and Smart Home energy management systems allowing homeowners to control their home's operation from control panels/Smart phones, and get real-time information on their energy usage.

Encouraging energy conservation and the use of high-efficiency appliances and lighting will also be an important focus of the outreach campaign, as conservation has clearly been shown to be the cheapest form of energy use reduction.

Solar Colwood will be funded through a shared model. Currently, the typical cost of solar thermal hot water installation (as a retrofit) is \$8,000 - \$10,000. Funding incentives would cover a significant portion of this cost, with the homeowner paying the remainder. ***The financial incentive will be higher for those who are early entrants into the program.*** In addition, Solar Colwood hopes to reduce average costs through the use of bulk purchasing arrangements.

Homeowners will be required to have a building permit from the City to install solar hot water systems. The City will also contribute directly through a 50% reduction in the cost of the building permit for solar installations.

BC Hydro is providing incentives for the installation of ductless split heat pumps, which will not only heat space but can also cool it on the hottest of summer days. These could be installed in addition to solar hot water heating.



Ductless split heat pumps are ideal for homes currently using electric baseboard heaters. Models range from the basic unit on the left, installed in a Washington State home, to more imaginative designs like the model on the right (circled), which has been designed to integrate artwork or photography which effectively hide the unit and artfully adapt to compliment any room decor.

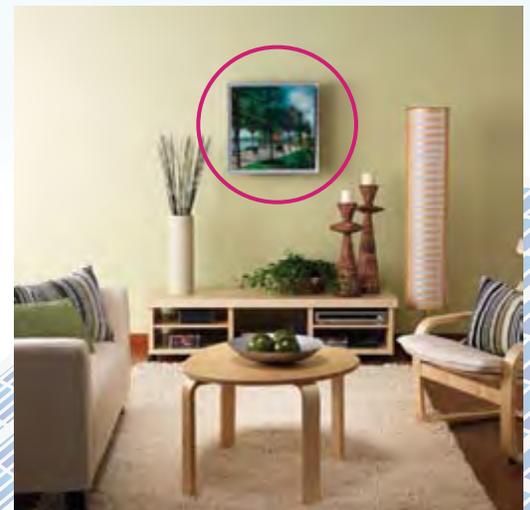


Solar Colwood will outfit some homes with Smart Home energy management systems.

Smart Meters

*A snapshot from our project partners at **BC Hydro** ...*

Smart Meters reduce wasted electricity by delivering your power with more stability and fewer fluctuations. When combined with other modern technologies, Smart Meters can help our community become more energy self-sufficient.



SolarColwood: Green Learning in Action

2 Solar Installations for Colwood's Fire Hall

Solar Colwood will install a solar hot water system at the Fire Hall, reducing our Fire and Rescue Services' dependency on the use of natural gas for hot water heating for showers and washrooms. In addition, the City plans to investigate the feasibility of using solar heat in a closed loop system to speed the drying of the fire hoses in its currently unheated hose tower.

The City also plans to install a small solar photovoltaic (PV) system on the Fire Hall roof in a direct grid Intertie fashion, so that it can offset some electrical consumption. What makes this system special is their method of backup storage. An Intertie solar power system uses the utility company's system as the storage. With this type of system you don't have to buy and maintain a collection of deep cycle batteries. When the sun is shining the solar panels will supply the Fire Hall's needs and any extra power generated is put back into the power grid for added dollar savings.

The Colwood Fire Hall is centrally located to serve as an accessible showplace and demonstration site for the community, since the solar hot water system installed there will be similar to those installed on most homes. People will be able to access the roof area of the Fire Hall to see what the system looks like, and a digital monitor will be placed in a public location so people can easily learn how much energy the solar PV system is generating. Colwood Fire Hall and Colwood Firefighters' Museum are both located within easy walking distance of several area schools, which will provide enhanced opportunities for Solar Colwood to reach out and share knowledge with residents of all ages during site tours and special community events.



Solar Colwood will retrofit the city's Fire Hall with solar hot water and a small solar photovoltaic system in a demonstration project where residents can see for themselves what the systems look like and how much energy can be generated.



Artist rendering of Colwood Corners

The long-awaited re-development of Colwood Corners provides another great opportunity to showcase clean energy technologies, this time as part of new construction. Our project partnership with League Assets, BC Hydro, Terasen Gas and Royal Roads University will enable research into the potential for district energy at this central location.

3 New Development Clean Energy Demonstration Project

Colwood Corners (located at the corner of Sooke Road and Goldstream Avenue) is currently an older style shopping mall, with largely single story commercial buildings. A substantial re-development has been approved, that will see extensive 'greyfield' re-development into a mixed use commercial/residential/business area. Full build out will likely take 10-15 years, but the first phase of re-development, including a five-storey, 70 unit, residential building over commercial space is expected to break ground in 2011, with completion of this phase in 2013.

League Assets is the project developer, and as part of the Solar Colwood project they will be building the units to have a very efficient building enclosure, and selecting from a number of district energy options including geothermal and other low-carbon systems for heating and cooling the units.

In addition, the federal funding will support a cost-shared approach for:

- Use of solar thermal for hot water heating;
- Units that are 'solar-ready' for solar photovoltaics (PV);
- Highly energy-efficient appliances, with as many as possible 'Smart Grid ready', and energy-efficient lighting;
- 'Smart Home' technologies will allow homeowners to control their home's operation, including home energy monitors that provide real-time feedback on energy consumption.



League Assets project at Colwood Corners will showcase 'Smart Home' technologies and intelligent appliances.

With technologies available today, zero-net-energy buildings are possible and guidelines are being developed by the Canadian Green Building Council to improve the environmental performance of developments at neighbourhood scales. About 10 of League Assets' units in this phase of their development will be designed to achieve as close to 'net zero' homes as is reasonable, featuring solar PV arrays to generate electricity.

These homes will still be a net consumer of electricity in winter months (although there will be a partial offset), but they will be targeted to meet their energy needs much of the year. In addition, we will investigate Smart Grid and other means of electrical load management during the winter months.

Terasen Gas will also be working with League Assets to explore geo-exchange and district energy possibilities for this program. A study of area district energy potential (co-funded by Terasen and BC Hydro, in partnership with Royal Roads University and the City) is planned for 2011.



Royal Roads University MBA students working on real world challenges. Photo by Dan Anthon, RRU

4 Electric Vehicle Charging Infrastructure



In 2012, electric vehicles (EVs) will become commercially available in Canada with early commercial rollout of several hundred units in BC by mid 2011, and it is hoped that about 10% of those units will find homes with people on southern Vancouver Island. Having a good network of opportunities for people to plug in their cars at home, at work and 'on the go' is critical for supporting the choice to buy and use electric vehicles. As much as possible, these should provide "Level 2" (40 amp) service as this provides for faster charging than a standard outlet. In addition, the Provincial Government is seeking to create a "green corridor" of very rapid charging stations (at which a vehicle could be 80% charged in only five minutes).

As this type of charging infrastructure is new, there are many aspects that will need to be tested. For example, for the 'at-home' application, can this be combined with smart meters that ensure that the vehicle only charges during off-peak hours to avoid adding to peak load, and what system will work best for this application? Can the cost of charging infrastructure be added to a utility bill to allow repayment over time? How does EV use get accounted for in measuring community greenhouse gas emission reductions?

For at-work stations, should a small fee be levied to cover the costs of electricity, and to avoid people using the 'at-work' station in preference to charging at home? For a commercial development, what are the implications of providing free charging to customers? Should there be ways to avoid peak use charging at these stations, and how should this be done? Are there regulatory or code issues? What options are there for cost reduction strategies? Can fees for charging be linked specifically to the vehicle (or its owner)?

The City of Colwood plans to explore the addition of electric vehicle charging stations in several applications. We are working with our partners to secure additional funding, and will provide additional details when confirmed.



Electric vehicle charging stations could become a common feature in the sustainable Colwood of the future.

SolarColwood: Supporting Elements

There are several supporting elements to this proposal:

Program management. The City of Colwood will hire a program coordinator to manage the Solar Colwood program, liaise with homeowners and businesses, work with partner groups and funding agencies, market the program within the community, share lessons learned, and work with BC Hydro and Royal Roads University on the monitoring and reporting component. City staff will provide program support.

Economic development/jobs. This project sets the stage to make Colwood a world-class leader in this field, which will attract high technology investment to the region. This program is as much about job creation as it is about reducing energy use and emissions. Local contractors are excited about the possibilities for expanding their business in tough economic times, and for building up a workforce that is well trained to meet the needs of the future. It is anticipated that this program will provide steady employment for eight–twelve full-time installers and several energy assessors, as well as additional work for contractors, as homeowners choose to take advantage of other retrofit opportunities (such as new windows).

A training program to ensure that the program has the qualified personnel necessary to do solar thermal installations. The training program will build on the skills already developed within the T'Sou-ke First Nation, and will focus on bringing some of the T'Sou-ke installers to full CanSIA (Canadian Solar Industry Association) certification. In addition, in the second and third year of the program the training will expand to include certification and training for installers from other First Nations.

Education and outreach. The cheapest way to reduce greenhouse gas emissions is through energy efficiency. While many people already know this, there is frequently a large gap between knowledge and action. The Solar Colwood program provides several important points of contact with the public to raise awareness of energy use and the benefits from conservation. Outreach programs will include community events (Solar Days, public workshops), media coverage (local and national), information dissemination to schools and the community at large. Some of the outreach will occur through the West Shore Chamber of Commerce's Climate Action West Shore (CAWS) initiative, which has been working to help citizens meet sustainability goals.



The T'Sou-ke First Nation is now the largest energy producing community in B.C. Their innovative community program is conserving energy and creating well-paid local employment.



West Shore-based Energy Alternatives demonstrate clean energy options in conjunction with many of Climate Action West Shore's community outreach and education events, including the upcoming Greater Victoria Youth Climate Action Summit and Off-the-Grid Music and Art Festival on April 21, 2011.

Continued on page 8

Solar Colwood's Supporting Project Elements *(continued ...)*

Arts and culture. Solar technology can be beautiful as well as functional, and is a powerful way to celebrate the technology and generate additional interest. This has been well demonstrated through the T'Sou-ke Solar program, and Canada's first LEED AP qualified artist Sandra Fowler is already hard at work in Colwood to integrate PV with fine art glass. The Solar Colwood program will also reach out to members of local First Nations to encourage artistic contributions from their communities.

Research. Royal Roads University and its students will also be responsible for conducting ongoing applied research (e.g., into best practices, and life cycle analysis of solar hot water systems), and providing this information to the program team. This builds on the Memorandum of Understanding signed between the City of Colwood and the University, whereby the city provides a 'living laboratory'—a classroom where RRU faculty and students undertake research, thesis work and ongoing education in a 'real-world' setting. This research is part of Colwood's mission as a 'green learning university city'.

Monitoring and reporting. One of the main program goals is to ensure that the lessons learned are shared with others. The Royal Roads University (RRU) Office of Sustainability will provide considerable expertise as well as verifiable, "arm's length" reporting on the program. RRU intends to monitor a variety of aspects of the program, including impacts on energy use and greenhouse gas emissions, economic spin-offs, social diffusion of clean energy concepts, and market acceptance of the products. BC Hydro will be measuring the energy benefits and greenhouse gas reductions of the program to determine which technologies and retrofits are most effective. BC Hydro's province-wide Smart Metering and Infrastructure Program will help to gather electricity consumption data with the smart meters which will be in place before the end of 2012.

Municipal utility. The City of Colwood intends to create, in partnership with a large company in the utility business or other suitable entity, a municipal utility that could be ready to continue the work of retrofitting existing housing stock as the Clean Energy Fund resource winds down.

Solar Colwood Program Budget

The total program is valued at \$12 million, representing a significant investment in the economy of Colwood and southern Vancouver Island. About one-third of the funding (\$3.9 million) comes from Natural Resources Canada's Clean Energy Fund. Of this funding, by far the largest portion (over \$2.3 million) will go directly to Colwood homeowners and businesses in the form of cash incentives.

The Solar Colwood partners are also contributing to the various program initiatives, through cash and in-kind contributions. Additional cash and in-kind contributions of over \$1 million have already been confirmed, and the City is working to confirm additional funding sources. Homeowners and businesses who choose to participate in the program will also contribute, paying a portion of the cost of installations.

City of Colwood (staff and members of council) will be contributing in-kind time to ensure the program's success, and this investment of time will produce far-reaching benefits to the community, including increased economic activity and lower energy costs for participating homeowners and businesses.

For more information, contact Colwood City Hall at 250.478.5999 or visit our website.



T'Sou-ke First Nation artist Mark Gault, etching a Coast Salish sun design into the solar panels.



The work of fine artist and solar PV glass designer Sandra Fowler.

Solar Colwood Partners

