Energy related Watershed Ways Articles in this document include:

Using manure to generate electricity

01 Mar 2009 Janet McNeill

I first learned about their unique operation in the CBC Fifth Estate episode "The Gospel of Green," and was fascinated to learn about this innovative project in our area. The day I visited the farm to chat with Paul Klaesi was the very one that their Hydro hook-up finally went "live" - so now Fepro farm is selling energy created on-site, to Hydro One.

The farm has 300 Holstein cattle, and what the Swiss-born brothers have done is create a manure digester and methane-powered generator to take the "poop" and turn it into enough energy to power 300 homes. Grease (not French fry oil) from grease traps in restaurants in Ottawa and Toronto is now also added to their energy mix.

The two brothers have been working on this innovative technology for 10 years now. The road to becoming an independent producer of electricity hasn't been smooth, exactly, but Paul Klaesi, who has a masters degree in high voltage application and a Swiss high voltage inspections degree, has always been confident of their project's soundness.

In chatting with Mr. Klaesi, I learned that, although the two brothers have had to face down daunting bureaucratic and regulatory mazes, they chose to persist and to navigate their way through these many challenges. Along the way, Paul helped co-found the AgriEnergy Producers'Association of Ontario, a group for farmers involved in producing energy. Cooperation among APAO members has helped streamline the process of having farms connect to the Hydro grid. In future, farmers who set out to do what's been done at Fepro Farms will find inter-connection issues considerably more straightforward.

The Klaesi brothers have had quite a bit of support along the way from OMAFRA - the Ontario Ministry of Agriculture, Food and Rural Affairs. In 2007, they won a Premier's Award for Agri-Food Innovation Excellence - including a $50,000 cash prize. Clearly, their efforts have been noticed and supported in "high places."

When I asked Paul Klaesi why he thinks there is so much more energy-related innovation in Europe than in Canada, he replied that in North America there seems to be an obsession with bigness. Europeans seem more inclined to recognize the power of many small things adding up incrementally to a large contribution. He cited the presence of solar panels on barn roofs in Switzerland and Germany, and the fact that many homes in Germany have solar panels on their roofs. He's a big believer that smallness rather than bigness is what's needed, and he also believes firmly that dealing properly with energy "streams" such as manure and grease is a necessity.

The AgriEnergy group is a member of the Ontario Sustainable Energy Association (OSEA), a group that supports Ontario's Green Energy Act.

Asked to give advice to would-be innovators, Paul Klaesi is liable to say, "Just take the plunge."

Ralph Waldo Emerson said, "Do not follow where the path may lead...go instead where there is no path, and leave a trail." The Klaesi brothers are definitely local trailblazers!

You can watch a video about the Klaesi farm at http://tiny.cc/Aqhoi.

On April 23rd, ORI will be cooperating with the Marguerite Centre in a public showing of "The Gospel of Green" in Pembroke. For more information, contact Amber at (613) 732-9925 or amber@margueritecentre.com

Janet McNeill is a member of the Ottawa River Institute, a non-profit, charitable organization based in the Upper Ottawa Valley. ORI is supported by the Ontario Trillium Foundation, local donors and volunteers. This article is 15th in a series on energy innovators in the Ottawa Valley. Previous articles in the series can be found on the Ottawa River Institute Web site <http://www.ottawariverinstitute.ca/>

Find out what the Green Energy Act will do for Ontario

01 Feb 2009 Janet McNeill

On Tuesday, February 10th, 2009, residents of Renfrew County will have a great opportunity to learn about how we can all take part in the "green energy" revolution we keep hearing about. From 7 - 9 pm that evening, the Ottawa River Institute will host a presentation by the Ontario Sustainable Energy Association (OSEA) at the Whitewater Township Memorial Hall in Cobden.

The Ontario Sustainable Energy Association represents groups of farmers, businesses, municipalities, First Nations and individual citizens who are involved in community-owned renewable energy projects. OSEA receives funding from the Ministry of Agriculture, Food and Rural Affairs; the Oak Foundation; the Ontario Trillium Foundation and the Community Power Fund.

OSEA's motto is "100% sustainable energy is 100% achievable," and to that end is working with like-minded organizations to promote a Green Energy Act for Ontario.

The idea behind the proposed Green Energy Act is to transform Ontario's energy sector into a model of sustainability and an engine for economic growth.

You can find a two-page Executive Summary of the proposed Green Energy Act on the Internet at http://www.greenenergyact.ca/

The proposed act is a work in progress, and OSEA is currently doing a "roadshow" around the province to give Ontarians the opportunity to learn more about it.

According to OSEA, the proposed act

"can provide a lower cost option to Ontarians. Evidence submitted to the Ontario Energy Board (OEB) hearings shows that a green energy powered electricity system with a greater emphasis on conservation and efficiency would be at least 11 per cent less expensive, and potentially up to 32 per cent less expensive, than the Ontario Power Authority's (OPA) proposed Integrated Power System Plan (IPSP).

The proposed Green Energy Act includes impressive targets for conservation (6,300 MW by2015), new installed renewable energy (10,000 MW by 2015, 25,000 MW by 2025), Combined Heat and Power (CHP) - 3,000 MW by 2025, and a 30% reduction in "end-use natural gas consumption by 2017."

These are claims well worth learning more about! Everyone is welcome to attend OSEA's February 10th Cobden event. Bring along any questions you have about renewable energy and community-owned projects.

Recently, Jim Woehrle and Julie Bach, Minnesotans for an Energy-Efficient Economy, have said "Every time humankind has switched from an existing fuel to a newer one - from wood to coal, coal to oil, oil to natural gas - the switch has been associated with economic progress. The same will be true for alternative energies, such as wind energy, solar power, cogeneration, and fuel cells."

Much longer ago, Socrates said, "The secret of change is to focus all your energy not on fighting the old, but on building the new."

Watershed Ways is a regular publication of the Ottawa River Institute, a non-profit, charitable organization based in the upper Ottawa Valley and supported by the Ontario Trillium Foundation and local donors. For more information about ORI, call 613-333-5534 or visit <http://www.ottawariverinstitute.ca/> For more info about OSEA, visit their Web site at <http://www.ontario-sea.org/>

ORI Promotes "Renewable" in Renfrew County

01 Aug 2008 Janet McNeill

Here in Renfrew County, several Ottawa River Institute projects have been helping to raise awareness about and promote energy efficiency/conservation, local food self-reliance, and "green building" that involves passive solar design and wind and solar energy.

ORI has received grants from the Ontario Trillium Foundation and the Ontario Ministry of Energy to fund several projects that have been coordinated by ORI Project Coordinator Cheryl Keetch.

Ms. Keetch made more than ten "Introduction to Renewable Energy" presentations across Renfrew County - a project that was launched on Earth Day (April 22nd), 2007. She then gave presentations on "Local Foods: You Are Where You Eat!" to six municipal Councils in the County.

In the Fall of 2007 Cheryl launched the 'Home Energy Upgrades' project that saw her give five workshops around the County (mostly in different individual homes) to teach participants how to do conservation activities such as caulking windows and doors, installing weather-stripping and hot water heater jackets, and how and where to install pipe installation. These are excellent hands-on, down-to-earth practical opportunities; I know because my home was one of the ones she presented in! She will be doing 8 - 10 more of these Home Energy workshops this Fall. If you are interested in participating, please send an email message to ckeetch@webhart.net

Earlier this year Ms. Keetch designed a "Green Building and Passive Solar Design" presentation that she has shown to eight different groups around the County. This was a thorough introduction to the many different kinds of "alternative" housing styles now on the increase all over the world as cheap oil supplies dwindle and the recognition grows that new building methods are needed. Those who attended were given information on local builders, designers, suppliers and installers of alternative energy, along with some recommended books and Web sites.

Thanks to a recent private donation made to the group, a new ORI project is also now underway.

On Saturday and Sunday, October 4 and 5th, two organized "positive energy tours" featuring alternative building and energy will be taking place. The October 4th one will involve houses in the Wilno area, while on the 5th, homes in the Matawatchan area will be featured. The tours will include quite a variety of houses and building strategies. The homeowners on the tour will be asked to tell their "story" - in other words, what motivated them to build using alternative energy methods, and what lessons they have learned that they can pass along to others hoping to undertake similar projects.

These kinds of tours have been on the increase around Ontario. The Citizens for Renewable Energy group in Lion's Head, Ontario used to run an annual tour, and their example inspired a group in the Prince Edward County area; theirs took place on Earth Day weekend. A tour also took place recently in Peterborough, and there will be one this Fall inThunder Bay. An idea whose time has come, seemingly!

Future Watershed Ways columns and the ORI Web site will provide more detail about ORI's upcoming Fall events. If you would like to get on a list for the house tours, please send an e-mail message tojanetmcneill@nrtco.net

Watershed Ways is a regular publication of the Ottawa River Institute, a non-profit, charitable organization based in the Ottawa Valley and supported by the Ontario Trillium Foundation and local donors. For more information about ORI, call 613-333-5534 or visit <http://www.ottawariverinstitute.ca>

A million ways to conserve energy? So why don't we?

11 May 2009 Lynn Jones

We've been getting better at spending electricity with appliances too. Shop for a new appliance and you will see mostly bigger and fancier refrigerators, washers, dryers and stoves with the occasional smaller, Energy Star model tucked away in the corner. Then there are air conditioners - one of the biggest electricity guzzlers of all. In recent years "central air" has been added to many homes, and truckloads of room-sized air conditioners are snapped up at the first onset of hot weather each spring.

Air conditioners use an enormous amount of electricity, so much that they have shifted the occurrence of peak electricity demand from winter to summer in Ontario. When I was a kid, nobody's home or car was air conditioned. We used fans, or rolled down the windows. Now we artificially cool our indoor environments and create large quantities of greenhouse gases and other pollutants in the process.

Per capita electricity consumption has been steadily rising all over the world in recent decades. Here in Canada, we are among the largest per capita electricity consumers in the world.

Swimming against this tide is possible. There are brave pioneers who have shown that it is possible to survive quite nicely on far less electricity than most households now use. But for the time being, serious energy conservation is practiced by a very small minority of Ontario households.

For anyone new to energy conservation, there are countless ways to do it. Just type "top 10 ways to save energy" into Google and you will come up with 15 million results (really). Or you can check out the Energy Conservation Week website (<http://www.energyconservationweek.ca/>) for 100 suggestions. This list includes a wide range of possible actions from the no-cost items like "hang my clothes outside to dry" and "turn off lights when not in use" all the way up to "Install a solar hot water heater," a big ticket item requiring a lot of effort and expense.

Solar hot water heaters are a good thing! Widespread use of solar domestic hot water heaters could save a lot of electricity in Ontario. Water heating accounts for one-fifth of the electricity bill in many households. Traditional hot water tank systems are wasteful and inefficent. Solar systems are readily available and can save about half of the energy used to heat water for a typical family of four each year.

Homeowners interested in finding out about solar hot water heating are invited to attend a free information session co-sponsored by the Ottawa River Institute in Renfrew on May 25th at 7pm. The venue is the Renfrew Public Library. Financial incentives for installing a solar hot water heater will be covered in the workshop and are also clearly explained on the website GoSolarOntario.ca.

So yes, there are lots of ways to save energy. And solar domestic hot water heating is worth a serious look for those with the time and financial resources to consider it. But the truth is, most people don't really get interested in energy conservation until electricity starts to cost a lot of money. That's what we observed in 2002 when electricity prices in Ontario spiked as a result of the short-lived deregulation experiment. Ottawa River Institute was just starting out back then and our first few energy conservation workshops were full to capacity. When price caps were brought back in, attendance rapidly dwindled.

Experience in the State of California also bears this out. According to the Washington Post (February 17, 2007), California has held its per capita energy consumption essentially constant since 1974, while energy use per person for the United States overall has jumped 50 percent. A combination of aggressive energy

conservation measures and sound government policies are responsible. The high price of electricity in California is one of the main drivers for the widespread adoption of conservation measures there. The per kilowat hour price in California is more than double the price in wasteful states such as Alabama that consume much more electricity per capita. The per kilowatt hour price in Ontario is comparable to that in the most wasteful states.

The price we pay for electricity in Ontario is low partly because we are not paying the full cost of our energy consumption choices. For example, health care costs resulting from power plant smog and other forms of pollution are not included, nor are the costs of looking after high level nuclear waste for generations to come.

It is too bad that despite some really urgent reasons to consume less energy, most of us in Ontario don't take it very seriously. Higher prices for electricity in the future will make us all a lot more interested in conservation. Until then, it's a hard sell.

Lynn Jones is a member of the Ottawa River Institute (<http://www.ottawariverinstitute.ca/>) a non-profit charitable organization based in the Upper Ottawa Valley. ORI is supported by the Ontario Trillium Foundation, local donors and volunteers.

Ottawa Valley School most energy-efficient in province

01 Apr 2009 Janet McNeill

Admaston is partly heated and cooled by ground-source heat pumps - a costly investment that is paying off over the long-term in energy savings. As Grade 3/4 teacher Scott Rubie, leader of the school's greening initiatives points out, Admaston's projects not only save energy and thus help the environment, they also set a great example to others - especially the school's students.

Scott Rubie is passionate about the need for schools to demonstrate opportunities to promote social change. He points out, "The schools are buildings which can provide public demonstration platforms for alternate energy technologies. In addition to the heat pumps, the large school roofs are excellent surfaces for solar panels."

Mr. Rubie's background is in science; he began his working career as a fisheries biologist. A teacher for 25 years now, he's convinced of the need for schools to teach our children how to take action - and to empower them with a voice. He's well aware of the positive force created when children learn things at school that they then take home and teach to their parents. He recalls his own dawning environmental awareness when he read Rachel Carson's *Silent Spring* at high school in the late 1970s.

Students and staff at Admaston will celebrate their status as Ontario's most energy-efficient school and other accomplishments during Earth Week this year (April 20-24) with a variety of special events. A presentation by the school's Environmental Club on habitat loss and climate change will help everyone appreciate the value of of a new 5000-square foot garden for native species of trees, flowers, herbs and shrubs. The garden will be a "mini habitat" that will attract birds and insects, and also an area for student observation and study. During Earth Week students will spend some time gardening and planting

sunflower seeds. The week will be capped off by a special visit from James Brose, Renfrew County Board of Education Plant Manager to officially announce Admaston's 1st place finish among Ontario schools in the Canada Green Building Council energy efficiency pilot project.

According to Scott Rubie, there are several forces at work in the Admaston PS community that contribute to the energy and initiatives now taking place there. Rubie points out that Plant Manager James Brose works very hard to ensure county schools lead the way on energy initiatives. Principal Lisa Murphy and teaching staff at the school are enthusiastic about environmental projects. Scott Rubie is an energetic proponent of "greening", the students are keen, and local parents are actively involved. The school also has the support of their municipal leaders. Finally, the Ontario government recently launched an Environmental Framework for Ontario schools that teacher Rubie is hopeful they really mean business about.

It all puts me in mind of Albert Schweitzer, who said, "Example is not the main thing in influencing others, it's the only thing." Admaston Public School is certainly setting a fantastic example!

Janet McNeill is a member of the Ottawa River Institute, a non-profit, charitable organization based in the Upper Ottawa Valley. ORI is supported by the Ontario Trillium Foundation, local donors and volunteers. For more information please see the ORI Web site at <http://www.ottawariverinstitute.ca>

The Argument in Favour of Wood Heating

21 Apr 2007 John Gulland

But judged by coverage in the mainstream media, wood heating is virtually nonexistent. Politicians don't debate its merits or plan for its strategic use. In a world of touch-screen convenience, pocket-sized computers, and automatic climate-controlled environments, wood heating is in every way rough, basic and steadfastly hands-on. People who heat with wood seem out of step with the modern world swirling around them. Have wood burners and those who labour to supply them with fuel slipped through a crack in the cozy consensus of modernity? Or are they onto something meaningful that has been missed by the mainstream?

The producers and consumers of fuelwood are engaged in an activity that reduces net greenhouse gas emissions while others merely fret about global warming. The fuelwood fraternity use a renewable energy resource, taking pressure off dwindling supplies of ever-pricier and scarce fossil fuels. Buyers of fuelwood create jobs close to home and strengthen their local communities. They know more about the cause-and-effect relationships of energy production and consumption than the economists who promote tar sands development. The story of wood heating early in the twenty-first century is about average families making decisions based on how they see their future unfolding.

Heating with wood is about a lot more than home heating. It is a tangible expression of self-reliance, of the courage to buck the trends and to resist the appeal of sedentary, push-button convenience. Heating with wood

reinforces links to the land and is a willing submission to the cycle of the seasons. It provides stability and security in a turbulent world.

To its owner, the woodlot is a living community in constant evolution, while to the urban observer it may be seen as a museum in which the removal of a tree exhibit renders it diminished. The woodlot owner watches its quality improve over the years, even as it yields products and creates employment. The owner's household earns part of its income by being a fuel supplier to the neighbours. It is a gentle way to produce energy compared to open pit uranium mines and nuclear reactors.

Fuelwood is the ultimate populist energy resource, the most easily accessed and affordable of all renewable energies. The major environmental impact of wood heating is visible for all to see in the form of smoke emissions, making everyone who uses it instantly accountable for their actions. The families that heat with wood and those that supply them with fuel do so privately, without fanfare or acknowledgement. It seems they wouldn't want it any other way. Heating with wood is its own reward.

John Gulland is an Ottawa Valley-based energy consultant and one of the main driving forces behind the Wood Heat Organization, a non-commercial service in support of responsible home heating with wood. For more information see the Wood Heat website at www.woodheat.org

Small hydro Ancient technology for modern times

19 Mar 2007 Lynn Jones

Perhaps it is this "alchemy" that provides some of the fascination with water power for people like Mike Dupuis. Mike has been interested in hydro power for his whole life. He was born and raised on the Waba Creek near Arnprior, Ontario, where his family owned an old mill.

When Mike was a young lad he learned what he could about water power from his dad. He then went on to study the engineering behind the technology.

In 1987 Mike founded Canadian Hydro Components (CHC) in Almonte, near Ottawa, to promote renewable energy, especially low-impact hydro. The company designs and manufactures state-of-the-art hydroelectric turbines for customers all over the world. CHC turbines are especially designed for what is called "small hydro", projects that generate anywhere from 50 kW (sufficient to provide for peak demand for about eight Canadian homes) to 15 MW (enough for about 2,400 homes).

Across the road from the CHC facility is the Almonte Upper Falls project. On display outside the old mill is a turbine from years gone by. In 1996, the old equipment was replaced with two new highly-efficient turbines manufactured by CHC that feed about 300 kW into the electrical grid with little environmental damage and no pollution.

Canada has abundant water resources. Water power is the main source of electricity in Canada, representing nearly two-thirds of all electricity produced. Furthermore, Canada is the world leader in hydroelectricity production. (Natural Resources Canada www.canren.gc.ca)

Many would argue that water power is the world's best renewable energy resource. It is relatively

inexpensive and clean and gives a better return on investment than photovoltaic or wind systems. It is more reliable than wind and works at night, unlike the sun.

Perhaps that is why humans have been using it for thousands of years.

Water power installations require no fuel and release no heat or noxious gases. They tend to have long life-spans (over 100 years in some cases) with low costs for maintenance and operation. They can be over 90% efficient in converting the water power to electricity (as is the case with CHC turbines) and they can respond in seconds to changes in load demand.

There is significant potential for additional hydroelectricity production in Canada. Unfortunately, the practice of heavily subsidizing power from other sources in Ontario has made the economics of water power development unattractive here. Hopefully this will change in the future. One step in the right direction was the recent announcement by the Ontario government that small power producers will be offered contracts to feed electricity into the provincial grid for a premium price. More information on this is available from the Ontario Sustainable Energy Association at www.ontario-sea.org/.

Water power fits well with the decentralized model of electricity generation described in a previous Watershed Ways article. Decentralized energy has many advantages over the outdated, centralized model which is highly inefficient and concentrates power and economic activity in a few central locations. Hopefully in coming years, with water power playing an important role, we will see electricity generation spread widely over the province leading to a resurgence of healthy and vibrant local economies.

Heating and cooling with earth energy

29 Apr 2006 Lynn Jones

Even more surprising is the fact that the technology to heat and cool buildings with earth energy is well-developed and already in use in over 30,000 houses and commercial buildings across Canada! The technology is referred to by several names including "geothermal heating", "earth energy systems", and "ground-source heat pumps".

Geothermal heating systems consist of open or closed loops of circulating water or glycol that picks up heat from the ground. The heat is then "stepped up" by a heat pump inside the building. Electricity is used to operate the circulation pump and the heat pump. This electrical energy is the extra third (not covered in the opening statement) that must be supplied, to move heat from the ground into the home.

One of the early adopters of geothermal heating in the Ottawa Valley, Peter Saffery has always been interested in energy efficiency. Using his professional expertise in the plumbing and heating business, he installed a geothermal system at his home in Micksbug back in 1988. He believes that ground source heating is an optimal technology for this region. Not only does it save money, but it greatly reduces greenhouse gas emissions associated with heating and cooling.

According to Peter, geothermal systems are highly efficient. They provide heating, cooling and domestic hot water for about one-third of the cost of heating a home with electricity. The cost to install a geothermal heating system can vary a great deal depending on the type of system, size of house, and other factors. The average cost for a 1200 square-foot home is in the neighbourhood of $8,000.
The CANREN website offers considerable information of how geothermal systems work. The earth around our homes holds a lot of energy. A meter or two below the surface, the ground is about the same

temperature as the average air temperature. In the prairies, that's about 5-6° C. In southern Ontario it's about 10° C, and on the East or West coast, about 11-12° C.

The sun provides this heat to the earth. Its energy warms the earth directly, but also indirectly. Its heat evaporates water from the lakes and streams, which eventually falls back to earth and filters into the ground. A few metres of surface soil insulate the earth and ground water below. The warm earth and ground water below the surface thus provide a free, renewable source of energy.

A simple flick of a switch is all that is needed for the heat pump to operate in reverse to cool a home by transferring the heat out of the house, where the cooler ground absorbs the excess heat.

Heating and cooling can also be provided by a lake or pond. The City of Toronto has a deep water cooling project which takes cold water from deep in Lake Ontario and uses it to cool office buildings in the summer.

The buried circulation loops of a geothermal heating system can be horizontal or vertical. They are generally made out of high density polyethylene and are expected to last 50 years or more. It is worth noting that when they do need replacing, polyethylene is likely to be extremely expensive as it made from oil. Fifty years from now there will be much less oil available and what is available will be extremely expensive. So while this technology is very efficient and attractive at present, it probably is not sustainable in the long term.

Lynn Jones is a member of the Ottawa River Institute, a non-profit, charitable organization based in the Ottawa Valley supported by volunteers, local donors and a grant from the Ontario Trillium Foundation.

MPP shows leadership on energy conservation

28 Apr 2006 Lynn Jones

John's role is an important one, not only because Ontario faces an electricity crunch, but also because our heavy reliance on fossil fuels will be increasingly problematic in coming years as supplies decline and prices escalate.

Even before he became energy critic, John was interested in energy conservation. Back in 2003, he and his wife Vicky began replacing all of the incandescent light bulbs in their home with compact fluorescent (CF) lights, beginning with the ones that were most used. This was a smart move on their part and shows leadership on this issue from an elected official, something that alas, is not as common as we would like it to be.

Compact fluorescent lights are much more efficient than standard incandescent light bulbs. CF lights use about 25% as much energy to produce the same light as an incandescent bulb. You can replace a 100-watt incandescent bulb with a 25-watt CF light and get the same light for one-quarter of the electricity!

CF bulbs are more expensive than incandescent bulbs but last much longer. They pay for themselves quickly and save many times their cost over the life of the bulb.

John and Vicky estimate that their monthly electricity bills decreased by about 20% as a result of the switch to CF bulbs. In an average sized-home with a monthly electricity bill of $100-$120 this is roughly $20, or $240 per year.

John is quick to point out that it is not necessary to replace all of your existing bulbs with CF lights to get the benefit. Replacing 6-8 of your most frequently used bulbs will noticeably reduce your electricity consumption.

Since they use so much less energy, CF lights reduce demand on the electrical grid. This is important because new generating stations and infrastructure for transporting electricity are very expensive. It makes eminent sense to save all we can before we install new equipment!

A 2003 Statistics Canada survey found that only a third of Ontario households had installed CF lights - about 6 million bulbs in total. This compares to roughly 75 million ordinary light bulbs installed. If a quarter of these bulbs are turned on at once, and they average 60 watts, they consume over 1000 megawatts. Household lighting is a big portion of the evening peak load on the grid in winter - and a significant opportunity for savings.

Peter Bursztyn of Citizens for Renewable Energy has calculated that if each household in Ontario were to install **one CF bulb per family member** in one of their most-used fixtures, the energy saved would be equivalent to that produced by a 500-megawatt nuclear reactor. This would power 250,000 households in Ontario at current levels of electricity consumption!

CF bulbs have two other important advantages. Because they use so much less energy, far fewer greenhouse gases and other pollutants are released into the atmosphere for the same amount of light. In addition, CF lamps generate less heat. If you have air conditioning, it will work less hard in the summer, saving you even more.

John and Vicky Yakabuski also conserve energy in other ways in their home. They have made sure their weather-stripping and insulation are up to par, they operate a very efficient washing machine, and they drive a fuel-efficient vehicle.

Lynn Jones is a member of the Ottawa River Institute, a non-profit, charitable organization based in the Ottawa Valley supported by volunteers, local donors and a grant from the Ontario Trillium Foundation.

Shower outdoors and save money!

23 Apr 2006 Lynn Jones

Their 4,000 square foot home is powered by 4 400 watt wind turbines and 3 five-panel solar arrays. A backup gas generator is used very infrequently. They use energy-efficient lighting (mostly compact fluorescent bulbs), and an energy-efficient refrigerator and washing machine. They dont use a dishwasher and only infrequently use a gas-fired clothes dryer because both use energy at high rates, and acceptable methods that dont require electricity are readily available!

The Copelands heat their home with wood and use a wood cookstove and a propane cooktop for

cooking.Their hot water is heated by a combination of a roof-mounted solar pre-heater and the woodstove.

Richard has a background in the solar photovoltaic business, and has really enjoyed designing his system. He believes that solar technology is underutilized at present. In particular, it would make a great deal of sense for solar applications for water heating to be more widely employed in cases where people are currently heating their domestic hot water with electricity. Heating anything with electricity is an extremely inefficient and wasteful process.

Off-grid living is not for everyone, partly because of the expense and complexity involved. But one of Richards inventions is something we could all have fun experimenting with while saving energy and money into the bargain. It requires only a small investment in materials, some time, some recycled parts and some basic handyman (or handywoman) skills. This great invention is a three-season, outdoor solar shower that is enjoyed by family and visitors alike. Here it is described in Richards words:

The design is simple, as passive solar heating should be. A tank, lying on its side, holds water above the shower stall in an insulated enclosure made out of local cedar. Reflecting material covers the insulation and transparent glazing covers the box that is angled around 45 degrees and facing south. The solar box is supported by posts and the enclosure is made to provide total privacy.

The tank, an antique 30-gallon expansion tank, was supplied by the best reuse center in Matawatchan the dump. We cleaned up the outside and painted it with a flat black heat-resistant paint. Then we found a piece of acrylic the right size to cover the solar panel and an old sprinkler head. With purchased pipes and fittings and valves, the shower was plumbed to allow filling of the tank with a garden hose from below. The shower will provide 4-6 showers per day (except when used by teenaged girls with long hair). Sometimes it can be cool (no sun) but most of the time it is right on. We do run into too hot conditions frequently but you can simply add more cold in this case. It is used in late April through Thanksgiving, when the hardier among us will bear the cold air and enjoy a hot shower.

We love it! Visitors line up to use it, and there is exhilaration in looking at mountains and sky, or talking with your friends while enjoying a refreshing shower in the great outdoors. There is appreciation for what nature can supply readily from the environment, without the costly addition of non-renewable energy. There is further satisfaction in finding materials that can be re-used instead of dumped.

Lynn Jones is a member of the Ottawa River Institute, a non-profit, charitable organization based in the Ottawa Valley.

Solar heating for everyone

23 Apr 2006 Lynn Jones

Upon retiring in 1999 as Chairman of Plaintree Systems, a software firm in Ottawa, David decided to turn his attention and energy to appropriate technology for developing countries. A particular interest of his at the time was solar cookers that would enable people to cook their food entirely using free energy from the sun. Rapidly-diminishing supplies of firewood for cooking and air pollution from cooking fires were two problems that David felt could be addressed by widespread adoption of solar cookers.

Early in his research, David came across a comment about how unfortunate it was that rural poor in developing countries were just switching to kerosene in time for it to become a scarce and expensive commodity. That statement prompted further research and the astonishing realization that the worlds supplies of oil and gas are likely to begin to decline soon causing fossil fuels themselves and all products made from them or using them (basically everything!) to become increasingly scarce and expensive. In turn, this change is likely to lead to a major transition in the developed world as we know it, to a situation in which everyone will have a lot less money and resources at their disposal.

Since that realization David has been actively researching and writing about oil depletion and sharing his knowledge with internet discussion groups and the Canadian Association of the Club of Rome, of which he is a member and which recently devoted an entire issue of its newsletter to oil depletion (Proceedings of the Canadian Association of the Club of Rome, Series 3, Number 6, September 2005). The issue is entitled The age of oil and contains articles by David and other leading energy analysts including former Chief Science Advisor to the Government of Canada Dr. Rennie Whitehead. It is available online atwww.cacor.ca/Proceed-Sep%2005.pdf.

David believes that keeping warm in Ontario winters will be a significant challenge as oil and gas become scarcer and more expensive, affecting the prices of electricity, chainsaw oil, transportation fuel etc. Because of this, David suggests new houses should have twice the insulation recommended by the building code, and older houses should be retrofitted with extra insulation where possible. Incorporating passive solar design principles is also recommended.

David has identified some simple, low-technology solar applications as useful solutions to the coming challenges of space and water heating. Two applications that he recommends are low thermal mass passive solar sunspaces (sunspace air heaters), and passive solar, batch hot water heaters (batch water heaters).

A sunspace air heater can be made cheaply or expensively, depending on resources and desired durability. It is essentially a greenhouse attached to the south side of the house. It gets hot when the sun is shining (even in January), and cold at night. It should contain almost no thermal mass that would keep it warm after the sun goes down, thereby heating the out of doors. When the sun is shining, hot air flows by natural convection from the sunspace through vents or windows into the house. When the air in the sunspace is cooler than the air in the house, passive dampers made of light plastic film close the vents automatically (or the home owner closes the windows). Sunspace air heaters can provide a lot of free heat any time the sun is shining. They can be designed with appropriate overhangs to keep out the sun in summer.

Batch water heaters consist of a black water tank in a large insulated box with a reflective interior and a glass cover (a glazing unit from an old patio door makes an ideal cover). The water in the black tank heats up whenever the sun is shines through the glass of the batch heater, pre-warming the water for a heater that uses purchased energy, or providing almost all hot water needed during the height of the summer.

David maintains a personal website (http://www.geocities.com/~dmdelaney/) where he has posted lots of information about passive solar applications. He recommends www.builditsolar.com as a good source of information on designs for sunspace heaters and batch water heaters. This site includes a page called Ten projects with one year paybacks!

Super-insulate for super savings!

23 Apr 2006 Lynn Jones

Freezing temperatures can arrive as early as late October and last until mid-April. This presents us with the significant challenge of heating our living spaces for up to six months of the year. Home heating is quite a costly proposition here, and is likely to become even more so in coming years.

The average owner of a 1200-square-foot home in Ontario spends between $1500 and $2300 on heating each year. Amazingly, it is possible to reduce this to as little as $500 by making a homes walls and ceilings extra thick and super-insulated and designing homes to capture free heat from the sun.

Frank Tettemer and Cheryl Keetch of Killaloe have perfected the art of building beautiful homes that require smaller than average amounts of heating fuel in winter. They operate a business called Living Sol Building and Design through which they design and build energy-efficient homes that incorporate such features as super-insulation and passive solar design principles and energy efficient heating systems.

In 2002 Living Sol built the first straw bale house in Renfrew County for a client in Killaloe, Haggarty-Richards. This 1,100 square-foot home is very energy-efficient, requiring only $260 per year worth of firewood to heat. The same fuel is also used for water heating in winter and some cooking. The walls are made out of square bales of straw, and are thus one and a half feet thick with an R-value of between 40 and 50. They are beautifully finished on the interior and exterior with hand-towelled cement stucco. South facing windows and patio doors allow considerable solar heat gain in winter.

Living Sol also builds energy-efficient conventional frame homes, cottages and additions. They are currently working on a two-bedroom, passive-solar, highly energy-efficient home in Barry's Bay. The anticipated fuel requirement for this home is around $500 a year, for both the heating and domestic hot water.

If you are building a new home, Frank says don't hesitate to ask your builder to put twice as much insulation as required by the building code. Careful attention to vapour barriers, weatherstripping and caulking will also add significantly to energy savings. It is also possible to retrofit existing houses with added insulation either on the outside or the inside. Each has its advantages and disadvantages, and both can be fairly costly, but with rising fuel prices insulation retrofits are definitely worth considering.

Frank believes that all houses in our climate should incorporate passive solar design principles. In essence these principles suggest placing larger amounts of window area on the south-facing walls, and building roof or awning overhangs out to just the right distance so that free heat from the sun can pour into the windows all winter when the sun takes a low arc through the sky, and be excluded in summer when it would be very unwelcome!

Other services that Frank and Cheryl offer through Living Sol Building and Design include design and installation of alternative water heating systems, solar and alternative energy systems, water catchment systems, home and cottage design and consultation services.

Cheryl maintains the Living Sol website at www.livingsol.com where you can view inspiring photos of a number of beautiful, energy-efficient homes that have been thoughtfully-designed with the Ottawa Valley's six month heating season in mind.

Lynn Jones is a member of the Ottawa River Institute, a non-profit, charitable organization based in the Ottawa Valley supported by volunteers, local donors and a grant from the Ontario Trillium Foundation.

Solar innovation that produces heat, hot water and electricity

16 Apr 2006 Lynn Jones

During the ice storm, Ottawa engineer Dave Gerwing, his wife and infant son spent 12 days without heat or electricity after up to ten centimeters of freezing rain downed power lines all over Eastern Ontario and Western Quebec. Dave was motivated by this experience to develop a method of providing heat and electricity, independent of the electrical grid.

Dave's creative process was informed by his knowledge that the solar energy striking the average building in Canada is sufficient to provide it with all its heat and power! The trick of course is how to capture and harness that energy.

Traditional flat solar panels capture only about 10-15 percent of the energy available. Their efficiency has been steadily increasing in recent years but even the most efficient ones available today capture only 30 percent of the energy that shines on them.

Dave's innovation, the Power- Spar, incorporates an absorptive surface in a concave, reflector that focuses the sun on a small area; thus it becomes possible to capture up to 80 percent of the sun's power, of which 4 parts are thermal and one part electrical! This means that for a given investment, it is possible to get a much larger quantity of energy from the sun in the form of both heat and electricity. This, in turn, greatly reduces the length of time it takes to pay off the initial investment with savings on one's energy bills.

The PS-2 Power- Spars, are units about 39 feet long comprised of a concave reflective surface with an absorber running from end to end. The mirror gathers and concentrates the sun's energy and focuses it on the absorbers which absorb heat. The absorbers can be supplemented or replaced by solar cells that produce electricity depending on whether the system is for heating or electricity or both.

Two 39' Spars can produce heat and electricity for an average 2000 square foot home.

The Power- Spar system can be connected to forced air, radiant baseboard, and in-floor heating systems. If the units are being used for heat, the system will also include a heat exchanger, a storage tank, and hot water radiant baseboards or another heat exchanger for heating air.

If the system is for generating electricity, the complete system will also include a grid tie inverter and optionally batteries .

A little grey box on the side of the system is connected to a sophisticated internet-based tracking system. Date, time of day, latitude and longitude are noted by the program to ensure that spars point in the right direction to capture the most solar energy. The program also tracks usage and provides data to the system owner, if desired.

Parts for these systems are now manufactured in Toronto, but the assembly is done locally using local

tradespeople. Dave believes it is important to keep money and jobs in the local economy. Dave's company, Menova Energy Inc., is based in Kanata. More information on Power Spars is available at www.power-spar.com

Why not wood?

03 Apr 2006

Finland's progress in this area is noteworthy. Wood energy plays an increasingly important role in that country's decentralized and diversified energy system. About 20% of Finland's primary energy comes from wood (compared to 3% in Canada). Further increasing the use of wood and other renewable energy sources is an explicit goal of the Finnish energy strategy.

Wood is used in older homes throughout rural Canada, but few new Canadian homes are designed to be heated by wood stoves. Finland is similar in this regard. Where Finland differs from Canada is in the development of wood-fired district energy systems.

District heating is now used in over 200 municipalities in Finland. It provides half the energy used to heat residential, commercial and public buildings. A network of insulated underground pipes connects buildings in a local area: a heat grid, as opposed to a power grid.

About 50 Finnish municipalities co-generate heat and electricity in their district energy facilities. Most have cooperative arrangements with power companies or local industries. Nearly all large district energy facilities - 75% of total capacity - are designed for co-generation. The electricity output of co-generation plants using wood fuels is 2000 MW - the equivalent of more than three Pickering-sized nuclear reactors. Most co-generation
plants have multi-fuel boilers that use both peat and wood, so only a portion of electricity is generated from wood.

In the bigger centralized district energy plants, use of wood chips is increasing and displacing the use of peat. Wood chips come from harvesting trees or parts of trees that are not suitable for saw logs and veneers. The price of wood chips has decreased due to technology development and government financial incentives like investment aid and energy taxes on fossil fuels.

The number of small-scale (< 1 MW) district heating systems is also growing in Finland. These systems, run by "biomass heating entrepreneurs", are typically locally owned and use wood chips. The fuel comes from the entrepreneur's own forest, from the forest owners in the area, or from small-scale portable sawmills in the form of sawing residues. The heating entrepreneur operates the heating plant and earns an income based on the
volume of produced heat.

The success of wood energy in Finland has many root causes, but chief among these is that it is well integrated with the existing forest industry. Sweden tried a wood energy strategy based on high-yield biomass production in willow plantations with far less success. The Canadian Forest Service only last week announced that it will devote 10% of its science programs to enhanced wood fibre production. Use of wood as an energy source will be part of the mixture of objectives for the new "Fibre Centre".

While relatively little attention is being given at present to use of wood chips in district energy facilities, Canada has some positive experience in this regard. The PEI Government built three small wood chip-fired facilities in Charlottetown in the early
1980s, serving the university, the hospital, and some government buildings. Today, an integrated district energy plant delivers hot water to a 15-km distribution system that runs throughout the core area of the city. The plant serves over 60 customers and heats 84 buildings, including all the provincial buildings, the university, the technical college, two shopping malls and many other apartment and commercial buildings.

The PEI Government sold off this profitable facility in 1995 (when oil prices were low) to a private company, Trigen Energy Canada Inc. Wood chips have been replaced as the fuel source by a combination of sawmill residues and municipal wastes (burning municipal wastes is controversial, owing to potential toxic emissions). According to Natural Resources Canada, there now about 60 district energy systems in Canada, but only three use wood. Most of the other district energy systems are fired with natural gas or oil.

Finland's positive experience with wood-fired district energy systems could be replicated in Canada, starting with First Nations communities and communities with active forest industries. As with other forms of renewable energy (e.g., wind or hydropower), initial investment costs are higher, but long-term operating and maintenance costs are lower than fossil-fuel facilities. This indicates a need for government incentives - such as the recent Ontario government announcement. With looming world-wide shortages of fossil fuels, it is encouraging that some government energy policy analysts are now thinking about wood.

Ole Hendrickson is a member of the Ottawa River Institute, a non-profit, charitable organization based in the Ottawa Valley supported by volunteers, local donors and a grant from the Ontario Trillium Foundation.

A refreshing vision for Ontario's electricity future

27 Mar 2006 Lynn Jones

Large centralized generating stations costing billions of dollars figure prominently in the government's vision of the future. But do we really need them?

Large centralized power stations are inefficient: up to two-thirds of the energy in the source fuel is wasted in the conversion to electricity and its transportation over long distances to end users. Large centralized plants are also expensive, slow to come on line, and vulnerable to system disruptions.

Happily there is an appealing alternative - "**decentralized energy**" (DE) which is energy generated at or near the point of use. Here's a vision of what it could look like in Ontario:

> *Existing large power plants are supplemented each year by a rapidly-increasing number of small and medium-sized producers who feed electricity into the grid. These producers generate*

electricity from a wide variety of renewable sources of energy and some non-renewable ones like natural gas.
Some examples of the renewables are small hydro, household wind turbines and wind farms, solar panels, solar roof shingles, biomass such as wood and biogas from landfills and manure. Electricity generation takes place close to where it is used, therefore any excess heat produced in the process is captured and distributed to nearby buildings, a technology called "cogeneration".

Rather than being passive users of energy, many buildings are mini power stations! They have solar panels, solar water heaters, micro wind turbines and heat pumps for extracting energy from the earth. Solar water heaters, heat pumps and cogeneration help to greatly reduce the demand for electricity for space and water heating. Wider use of biomass heating fuels such as pelletized wood waste and switch grass also reduces demand for electricity.
Different energy sources predominate at different times. For example, during heat waves when the wind turbines stop generating, solar panels really kick in, so much so that at times, there is power to spare which is stored in reservoirs for later use.
Because electricity generation is a local affair, people are much more "tuned in" to using energy wisely and voluntarily reduce their electricity use.

Decentralized electricity generation is quite popular in Europe. Thanks to supportive government policies, countries such as Finland, Sweden, the Netherlands and Denmark are already meeting a significant portion of their national electricity demand from DE. Many other European countries are following suit. Japan and California are making great strides in decentralized solar electricity generation.

According to the International Energy Agency, the decentralized approach to energy, if applied around the world could save **three trillion** dollars, in the next 25 years over the approach of large, central power plants remote from users.

Other advantages of DE include: considerable up-front private financing thus smaller public debt, rapid deployment, and a grid less vulnerable to widespread blackouts. DE also reduces transmission and distribution losses, greenhouse gas emissions and health care costs due to the emphasis on clean energy sources.

Perhaps the most exciting advantage of DE is that economic activity associated with electricity generation (eg. building, installing, and maintaining equipment) would be spread all over the province. More money would circulate in local economies and they would be stronger as result.

The recent announcement by the Ontario government that small producers will be invited to sell electricity to the grid for a premium price, is a great first step to making this vision a reality. Kudos to the government for this decision, and to many tireless and visionary folks in the sustainable energy sector who have helped move us toward a better vision for electricity generation in Ontario!

If you like the DE vision, please share it with your family, friends and the Our Energy Our Future folks. Write to them at 900 Bay Street Hearst Block 4th Floor, Toronto, or submit your views through the Ministry of Energy website. If you want to know more about DE check out the World Alliance for Decentralized Energy at www.localpower.org

Lynn Jones *is a member of the Ottawa River Institute, a non-profit, charitable organization based in the Ottawa Valley supported by volunteers, local donors and a grant from the Ontario Trillium Foundation.*

Let the sun heat your water

04 Dec 2005 Janet McNeill

The small town of Perth, in the south-west corner of the Ottawa River watershed, is home to an organization that "has set out to show how a small town in central Canada can respond to the issues of climate change". The organization is called EcoPerth and one of its most innovative projects is aimed at increasing the use of solar energy for hot water heating.

A solar water heater can provide enough solar energy to meet about one half of the water heating energy needs for a family of four. Solar water heaters are thus a good way to reduce direct and indirect fossil fuel use.

Beginning a few years ago, EcoPerth "mapped" their town to determine how many houses could properly accommodate solar water heaters. An impressive 74% were found to be suitable, meaning their roofs are oriented between southwest and southeast, slope between 20 and 60 degrees, are un-shaded for most of the mid-afternoon, and have enough space for one or two solar panels (other factors include the shape of the roof and the presence of any possible obstructions).

EcoPerth partnered with a company called EnerWorks to supply the solar water heating units and arranged for bulk purchasing so that the cost of unit installation could be brought down by an average of $700 per system.

The units, which cost between $2000 and $3000 to install, enable householders to save about 50% on their hot water needs. Typical annual savings are between $250 and $350.

So far, five systems have been installed; 20 more are to be installed after Christmas, and another 30 during the next fiscal year.

EcoPerth is looking into developing a lease program, which would help out the householders who find the initial $2000 - 3000 cost a bit too steep.

There are different types of solar hot water heating systems. The ones being installed in Perth use south-facing solar collectors on the roof, ground, fence or wall of the house that gather the sun's energy during the day. These collectors are set at the same angle as the home's latitude north of the equator (in Ottawa, an angle of 45°).

A "system controller" monitors the temperature of the collectors and the indoor reservoir that holds the water. When it senses there is sufficient warmth to heat the indoor water, it sets off a pump that circulates "a heat transfer fluid" to the collectors. The water heated by the sun goes through a heat exchanger and is sent to the insulated water tank indoors. From there, it is fed into the house's hot water system, as required.

According to Natural Resources Canada, Canadian manufacturers have developed some of the most cost-effective solar domestic hot-water heating systems in the world. Consumers can now buy "off-the-shelf" solar water heaters that meet industry-wide standards, providing a clean alternative to gas, electric, oil or propane water heaters. Freeze-protected solar water heaters manufactured in Canada have been specifically designed to operate reliably through the entire year, even when the outside temperature is either well below freezing or extremely hot."

Solar energy is free, renewable, and non-polluting. Add to that a 50% saving on hot water expenses and

there are a lot of incentives for home-owners to invest in this technology.

A few Web sites you can visit for more information about solar water heaters are NRCan's at http://www.canren.gc.ca/prod_serv/index.asp?CaId=141&PgId=750#Solar ; EnerWorks athttp://www.enerworks.com/ie.asp and the Canadian Solar Industries Association, at www.CanSIA.ca

Janet McNeill is a member of the Ottawa River Institute a non-profit, charitable organization based in the Ottawa Valley.

Warmth through window covers

20 Nov 2005 Janet McNeill

With winter on its way, and fuel costs rising, it's a good time to hear about innovations in the area of window coverings - especially since, according to the Ministry of Municipal Affairs, heat loss through windows can account for as much as 25% of the average fuel bill.

Window quilts are one very effective type of insulated window covering. They usually consist of layers of fabric, insulation, mylar, and lining quilted together and made into attractive Roman shades. When made to cover a window opening and fitted with magnetic tape or wooden strips on hinges to seal them shut when they are lowered, they can increase the insulating value of a window from four to five times over that of a double-pane glass window!

Arnprior resident Dorothy Allemang has been making and using window quilts since the early 1980's when she learned about them from a provincial government publication. During the 80's and early 90's, she made many attractive and practical creations for customers all over the Ottawa Valley.

According to Dorothy, window quilts greatly increase the comfort level of a room in both summer and winter. In summer they keep the radiant heat out and in winter they keep the radiant heat in. They also block air currents. They are an ideal do-it-yourself project for someone who sews, as they are not overly complicated to make. A complete guide to making them, called "Shades for Comfort" can be downloaded free from the internet at www.warmcompany.com.

There are many other ways warm up your windows. One ingenious soul from the Killaloe area recently told me about two kinds of window coverings she has experimented with. The first was for three, large south-facing windows in her former apartment. She took two-inch white Styrofoam boards, cut to fit the window opening and covered them with bed coverings not then in use. Each day in the winter, as the day

wore on and the temperature grew cooler, she would place the covered boards into the windows, saving a great deal of heat from escaping through the windows in the process. She also used them in the summer, to keep the apartment cool.

Now she is in a different home and continuing her window-covering experiments for her two sets south-facing windows and a patio door, around which heat loss is generally considerable. For the summer months, she put together a layer of cotton broadcloth with a silver emergency blanket, using duct tape to hold them together and grommets for hanging purposes. For winter, still experimenting, she is adding a layer of reused drapery fabric, reinforced with more grommets. It delights her to think that, in doing this, she is both saving energy and reducing waste by creating new purpose for drapery fabrics and bedding not otherwise in use.

If you are interested in learning more about making window quilts or window coverings, or if you have tips of your own to share, please contact the Ottawa River Institute at 613-735-6444. Workshops on making insulated window quilts and/or boards can be organized if sufficient numbers of people are interested in attending.

Janet McNeill is a member of the Ottawa River Institute, a non-profit charitable organization supported by volunteers, local donors and a grant from the Ontario Trillium Foundation.

Waste cooking oil powers cars, trucks and buses

12 Nov 2005 Janet McNeill

On a beautiful sunny day recently, out in the country near Wilno, Steve Anderson of Arnprior shared his knowledge of how to convert waste cooking oil from restaurant deep fryers into fuel for his diesel engine pick-up truck. More than 40 interested folks from around Renfrew County and as far away as Burk's Falls attended.

Fuel from waste cooking oil is called "biodiesel" and it can be made from vegetable oils and animal fats according to a pamphlet from Natural Resources Canada. Steve prefers canola oil. It makes very good biodiesel, and by collecting it from restaurants he is helping to re-use a waste product.

The process for turning waste cooking oil into biodiesel involves several steps. The oil is filtered, warmed, stirred, and then mixed with lye dissolved in wood alcohol. The lye causes a chemical change to take place in the cooking oil, turning it into a mixture of biodiesel fuel and glycerine. Some equipment is required but it is fairly simple, and Steve has put his system together from previously-used materials, such as a heating element from a discarded hot water heater, plastic pails, and an electric drill.

Steve estimates that his fuel costs him 75 cents

per litre compared with about $1 per litre for petroleum diesel fuel or "dino"diesel as he likes to call it. For the last two years he has fuelled his truck and another family vehicle with straight biodiesel, except in the coldest months of the year when he mixes in 50% regular diesel, due to the fact that biodiesel gels at a higher temperature than its fossil fuel relation.

No modifications to the engine are needed in order to burn biodiesel. As Steve points out, the original diesel engine, demonstrated by Rudolf Diesel in 1893, ran on vegetable oil.

Steve has recently given six demonstrations on making biodiesel to interested groups around the valley, and has sold some biodiesel to interested individuals. He advises folks to start gradually with 10% biodiesel and work their way up to 100%. He also advises purchase of a spare fuel filter since biodiesel cleans the fuel tank, engine and other components due to its higher solvent action.

Many people all over the world are making and using biodiesel. In Canada, several municipalities have experimented with mixing biodiesel and regular diesel- with biodiesel constituting up to 20% of the mix- and using the resulting fuel in bus and truck fleets with excellent results.

According to Natural Resources Canada, there are many advantages to biodiesel. It is versatile, readily biodegradable in water, and it produces fewer emissions than petroleum fuel when burned. There are also engine benefits associated with biodiesel use since it is a very good lubricant.

With the world facing fossil fuel depletion in the near future, biodiesel can play an increasingly important role as liquid fuel for motorized vehicles. While it is clear that there is not enough arable land in the world to replace petroleum with biodiesel, it can play a role in a sustainable energy future where we carefully use liquid fuels for essential activities.

A wealth of information on making biodiesel from waste cooking oil is available on the Journey to Forever website at: www.journeytoforever.org. Natural Resources Canada's Office of Energy Efficiency offers information on biodiesel for municipalities and members of the general public.

Lynn Jones is a member of the Ottawa River Institute, a non-profit, charitable organization based in the Ottawa Valley.

How to be a wood burning wizard

11 Nov 2005

Sherrin admits "I've been polluting my neighbourhood, playing Russian roulette with my house and burning cords like they're out of style." He adds,
those "clouds of cheerful smoke coming from my chimney were actually signs of wasted energy, unhealthy emissions and a higher risk for a chimney fire or carbon monoxide poisoning."

Sherrin owns an energy-efficient, low-emitting wood stove. His firewood was well seasoned and kept dry. But he was overloading his stove and shutting down the damper too soon. He says that the main message from the workshop was, "Build small hot fires with dry wood."

With fuel costs going up, you may be tempted to burn fuels other than dry firewood.

Don't. Not everything that can be burned should be burned

Plastic gives off toxic fumes when burned, and won't provide any significant amount of heat. Pressed wood products like chipboard and fibreboard have glues that also give toxic fumes when burned. Pressure-treated wood contains copper, chromium and arsenic to kill wood-rotting fungi.

Take these products to the landfill: you don't want to breathe the smoke, or spread poisonous ashes on your property.

Also remember that not all wood-burning appliances are equal when it comes to reduced smoke. If you've got neighbors within hollering distance, use an energy efficient appliance that is designed to burn gases before they go up the chimney. Outdoor furnaces may be acceptable for rural landowners with ample wood supplies, but increasing numbers of municipalities are placing restrictions on their use in more densely settled areas.

Now for the good news: wood burning is a key component of a regional sustainable energy strategy. Wood biomass is a renewable fuel.

Fossil fuels were made mostly during the Carboniferous Era, hundreds of millions of years ago. The Earth is not making more of them, not in any appreciable amounts. We're having a big party. Solid or liquid carbon comes out of the ground, and makes a 1-way trip to the atmosphere as the greenhouse gas carbon dioxide.

Trees, on the other hand, grow all around us. While burning wood releases carbon dioxide, growing trees take the carbon dioxide back out of the atmosphere and turn it back into wood. The same cycle occurs in nature when trees burn in a forest fire, or when they die and are decomposed by microorganisms.

As long as sustainable forest management practices are being followed, wood energy is renewable.

Many people I've talked to think there is some special virtue in harvesting only dead trees for firewood. While I respect their desire not to harm living creatures, I point out to them that harvesting dead trees takes away extremely important habitat for cavity-nesting birds and other wildlife species. Fallen trees on the ground are habitats for salamanders, and can provide "nurse logs" for new tree seedlings.

In Europe, logging methods that did not recognize the value of snags and decaying logs have pushed woodpeckers, insects, and fungi that rely on these habitats to the edge of extinction. From an ecosystem perspective of doing least harm to living creatures, selective logging of live trees is arguably preferable to cutting only dead trees for firewood.

Wood is definitely part of a sustainable energy future in this part of the world. Given proper respect and consideration, it can put us closer to nature than nearly any other energy source.

Ole Hendrickson is a member of the Ottawa River Institute, a non-profit charitable organization supported by volunteers, local donors and a grant from the Ontario Trillium Foundation.

Using energy from the sun to pump water

04 Nov 2005 Lynn Jones

One of the most important and least considered uses of electricity is for pumping water. This is especially true in rural areas where homeowners rely on wells and farmers pump large quantities of water for their livestock.

Fossil fuel depletion affects price and availability of electricity in two ways. First, natural gas and coal are used to generate much of our electricity. Second, oil is needed to fuel the equipment used to produce and transport fossil fuels, to maintain pipeline and power grids, and so forth; thus impacting on many steps in the production and use of electricity.

It's somewhat reassuring therefore to know that we all have access to a readily available, inexhaustible source of energy for pumping water - the sun.

Bob Dobson, of Snake River near Cobden, has been using solar energy to pump water for his cow-calf farm for the past ten years. The system is powered by two 75-watt solar panels which capture the energy from the sun and store it in two 12-volt deep cell marine batteries; these in turn send power to the 24-volt floating pump.

The water for the system comes from a man-made, spring-fed pond. Three well tiles are buried in the ground ten feet away from the pond. They are connected to the pond, and are thus about half full of water year-round. The pump floats inside the well tiles.

A watering trough for the cattle is 600 feet away and slightly elevated from the location of the pump. Water is pumped 15 feet vertically and 600 feet horizontally. The pump, activated by an electronic float, fills the 1000-gallon trough in about 20 minutes. It comes on when the trough is half empty and turns off when the trough is full.

The system operates without any human intervention at temperatures as low as minus 10 degrees C. Below minus 10, it requires minimal management, for example breaking ice on the surface of the water in the trough.

The full water requirement for100 cows and their offspring, can be provided by this system, even on the hottest days in the summer. In fact, it is ideally suited for this purpose since, on the hottest days, when the cattle are drinking a lot more water, the system is absorbing a lot more solar energy!

The system cost about $5500 to install. Half of the cost was recovered by a federal-provincial funding program for environmental protection on farms. The batteries cost about $250 (total) and need to be replaced every 6-7 years, but savings in not having to purchase electricity from the grid easily pay for these batteries.

There are many advantages to this system beyond saving money on electricity. In fact, the system was specifically designed for the landscape, the environment, and a carefully-considered, rotational grazing system for the Dobsons' grass-fed cattle, to maximize benefits to the environment, the cattle and the farm ecosystem. Keeping cattle out of the stream prevents pink eye and foot rot, and keeps the water clean. The improved health of the cattle and extra gain (gain increases proportionally with the quality of drinking water), have paid for the system many times over.

Bob suggests that similar projects can be partly funded by the recently-announced Canada Ontario Environmental Farm Plan program. Details are available on the Ontario Soil and Crop Association website at www.ontariosoilcrop.org. He also questions why there are not yet any programs to support home-owners who wish to install renewable energy generating systems?

Lynn Jones is a member of the Ottawa River Institute, a non-profit charitable organization supported by volunteers, local donors and a grant from the Ontario Trillium Foundation..

Putting a magical bright red "blower" door to good use in Pembroke

17 Oct 2005 Janet McNeill

Did you know that it is possible to get an EnerGuide rating for your house? And that it will tell you how energy-efficient your house is compared to others the same size and age in your climate zone? Well it is and it does, and it's all part of a program from Natural Resources Canada called EnerGuide for Houses. Even better, the program provides funding to partly reimburse participants for any improvements they make to their home's "energy performance".

The EnerGuide program uses sophisticated tools and software to determine the "energy performance" of a house and find sources of heat loss and energy wastage. One of the tools is a bright red "blower door" that the technician installs in the front door opening. Then, with all of the doors, windows, flues and other openings tightly closed, air is sucked out of the house by a big fan that is built into the blower door. This enables the technician to walk through the house and find air leaks, as the suction creates quite a draft. The cracks and crannies discovered this way can add up to a hole that is one square foot or more in size resulting in heat loss worth about $500 each year on average.

For John Bateson and Peggy Patterson of Pembroke, taking advantage of the EnerGuide for Houses program has been a win-win-win scenario resulting in reduced energy consumption, lower fuel bills, a warmer, more comfortable house, and reduced greenhouse gas emissions.

Peggy and John got an EnerGuide home energy assessment done in 2002 because their house was drafty and felt cold in the winter, even when the thermostat was turned up. One of the bedrooms in their house was particularly cold, and they couldn't figure out why.

The assessment of the Bateson-Patterson wood and stucco 1910-era house, which had some insulation in the attic, but none in the walls, took a couple of hours. Their rating came in at 57 out of a possible 100, and the report stated that, if they made the recommended improvements, their rating could go up to 75. It also estimated percentage savings for each recommendation, and the approximate payback period.

There were some surprising findings. For one thing, there was an air leak in the attic that was sending cool air down a plumbing chase into the basement. There were other unexpected leak locations, particularly in the cold bedroom, that John and Peggy would not have been able to track down without professional assistance.

One of the easy recommendations was to reduce air leakage by 30%, which they achieved by doing some caulking. The big job they needed to do involved having insulation blown into the home's walls - work they had performed by a contractor that cost them around $2,500.

After the work was done in the summer of 2004, the house was re-evaluated and their rating increased to 72. Gas consumption decreased by about 40 percent after adding the extra insulation. As well as making their home more energy-efficient and thus saving them money, they now find their house much more comfortable in both summer and winter, and also quieter.

After spending about $2500, their reimbursement from the government was $614, and they also received a $150 credit on their gas bill from Enbridge. Along with lower heating bills, they feel good about reducing their contribution to climate change.

John is an enthusiastic supporter of the EnerGuide program. His advice? "Do it!" He also suggests making sure one has a qualified contractor by asking for references, and using cellulose insulation rather than fibreglass which is carcinogenic.

In order to receive the federal rebate you must have a home energy assessment done. The Bateson-Pattersons booked their assessment through the EnviroCentre in Ottawa (613- 580-2852).

A great source of information on the EnerGuide for Houses program is the Green Communities EnerGuide for Houses website (www.egh.gca.ca) or call them at 1-888-661-0000. Exciting recent changes to the EnerGuide for Houses program include an extension to rental units and a program especially for low-income households.

Ontario's Hydro One recently announced that qualified low-income customers heating their homes electrically are eligible to receive a free EnerGuide assessment and a grant up to $3,000 for energy efficiency retrofits. Call 1-877-506-7584 for more info.

Janet McNeill is a member of the Ottawa River Institute, a non-profit charitable organization supported by volunteers, local donors and a grant from the Ontario Trillium Foundation.

Water power pioneers in Killaloe

05 Sep 2005 Lynn Jones

This scale of power generation from falling water is called "micro hydro" and it is underutilized in Canada at present. According to Andreas, in his home country of Germany, there are over 30,000 microhydro installations, whereas here in Ontario, there are only 60-some.

The Vornweg home used to be a grist mill. It was built in 1876 and when they bought it in 1991, it still

had two very nice, but very inefficient old turbines. They put in a new turbine, manufactured by Canadian Hydro Components in Almonte, a leading hydro component company that installs turbines all over the world.

The Vornweg living quarters are beautifully renovated, modern, comfortable and energy-efficient. Although they share the big red mill building with white water and a hydro turbine, you wouldn't know it if they didn't take you downstairs and show you the installation. As you get closer to the water, descending old stone steps past ancient wooden beams, the noise becomes considerable and you can actually see the frothing water. Inside their living space though, you can't hear the turbine at all.

Water power available from creeks and rivers is more abundant at some times in the year than at others so the Vornwegs do use some power from the electrical grid. To keep track of the coming and going of energy in their house, they have two electrical meters - one spins when they are producing and the other when they are using (if the turbine shut down for some reason). They get paid by Ontario Power Generation for everything they produce and get a bill for what they use.

The net result is that they make a few thousand dollars per year. Their system was paid for within 10 years. Andreas points out that the system would have paid for itself much sooner if Ontario had a realistic price for electricity. The price currently paid to small generators like the Vornweg's and charged to consumers is kept artificially low at around 5 cents per kilowatt-hour. A more realistic price according to Andreas would be 10 to 15 cents per kilowatt-hour. (A kilowatt-hour (kWh) is the amount of energy consumed by ten 100-watt light-bulbs burning for one hour.)

The Vornweg's year-round average production level is 20 to 25 kilowatts. To get a sense of how much energy this is, imagine 20 or 25 houses each with ten 100-watt lightbulbs burning 24 hours a day, seven days per week for the whole year. This is enough to power 3-4 houses in Canada or 10-15 houses in a more energy-conscious and efficient country like Germany.

There is a lot of potential for increased use of microhydro in Ontario. As we move toward paying the real price of electricity in coming years, and start to experience the end of cheap fossil fuels, this ancient method of power generation will likely make a comeback.

Leading the list of energy innovators in the Ottawa Valley

04 Sep 2005 Lynn Jones

It may surprise some readers to learn that one of the most inspiring energy innovators in the Ottawa Valley is a large institution that is central to the lives of many Valley families. In the past couple of years, the Renfrew County District School Board (RCDSB) has made a series of breath-taking innovations that have saved large amounts of energy and placed it on the leading edge of energy innovation, not just in the Ottawa Valley, but in the province and country as well.

Two years ago, in the fall of 2003, the RCDSB embarked upon a program called "Destination Conservation" in most of its 26 elementary schools. The DC program, which began in Alberta, involves

students, teachers, custodians, parents and principals in conserving energy in their schools. Grade five teachers and students receive extensive training and then take a leadership role in their schools, conducting energy audits and behaviour change programs. DC was sponsored initially by the Ottawa River Institute through a grant from the Ontario Trillium Foundation.

The RCDSB's success with the DC program has far surpassed results obtained elsewhere in the province. The trainers have been very impressed by the attendance and enthusiasm of the participants. And the results speak for themselves. James Brose, energy management coordinator for the Board so far estimates that annual utility savings on the order of 175 thousand dollars have been achieved from behaviour changes such as turning off lights and computers when not in use, turning down the heat, keeping radiators clear and making sure that exhaust fans don't run unnecessarily. The Board is set to begin the third and final year of DC in its elementary schools and would like to extend the program to include high schools this year.

Last summer, with funding from Natural Resources Canada, the RCDSB conducted energy efficiency retrofits on five of its elementary schools. Changes included upgrading of insulation, installation of new windows, new lighting and installation of new heating systems including new modular boilers that are much more efficient and adjustable to varying demands for heat throughout the building and the school-year. A particularly innovative addition at three of the schools was a heat wheel ventilation unit, a big wheel covered by a fine synthetic membrane that mixes cold incoming with warm outgoing air. The warm air preheats the cold incoming air to 65 degrees Fahrenheit resulting in considerable energy savings and a great improvement to comfort. This summer retrofits were completed at Mackenzie High School, Fellowes High School, Westmeath Public School and McNab Public school. The majority of this work was performed by the School Boards' in-house trades-people, with assistance from contractors and student apprentices. This approach provides the Board's employees with the opportunity to stay current with new technology.

To keep track of its energy savings (a requirement of its NRCan grant) the RCDSB has developed an energy monitoring and tracking system that is very impressive in its sophistication and simplicity of use. All energy-using devices in every school down to the last light-bulb are tracked and data are accessible to staff and students through a web interface. The system is called Energy Investigator and provides staff and students with immediate feedback on the impact of their programs to reduce energy consumption. The system was fully operational for the start of the current school year.

Also new for the current school year is a solar heating system at McNab Public School. The system is based on a series of 33 units called Power Spars, an innovative device for capturing solar energy and using it to heat water or generate electricity. These devices are designed and manufactured in Kanata by a company named Menova Energy Inc. The system is expected to provide 66% of total heating for the school, with the balance coming from propane boilers. NRCan staff are very interested in this project and will be using data from McNab school to verify some of their projections about solar heating systems. There is also a high level of interest from other school boards and municipalities.

The RCDSB has an ambitious goal: to reduce energy consumption by one third, for a saving of one million dollars annually! With these innovations they are well on their way to achieving it. Congratulations to RCDSB Director of Education Eleanor Newman, Energy Management Coordinator James Brose, Curriculum Coordinator Sherri Wylie, Board members, staff and students, for outstanding examples of energy innovation. We applaud your leadership!

Lynn Jones is a member of the Ottawa River Institute, a non-profit charitable organization supported by volunteers, local donors and a grant from the Ontario Trillium Foundation.

The bigger story behind Katrina

04 Sep 2005 Lynn Jones

According to the Globe and Mail, *"The hurricane has knocked out more than 10 per cent of U.S. refining capacity and virtually all oil and gas produced in the Gulf of Mexico perhaps for months….The hurricane also caused substantial damage to the distribution network, including pipelines and port facilities, used to get crude to and from refineries… with supply and demand already tight across North America, Katrina's impact has been magnified."* (August 31, 2005, *"Disaster Scenario for Refining"*). So there are clearly real reasons for the price spikes. But if we step a little farther back and look at the bigger picture, the spikes may be seen as only a preview of more to come.

Long before Katrina hit, independent scientists who study the depletion of oil and gas, were warning of an imminent peak in world oil production. One such scientist, Dr. Kenneth S. Deffeyes, professor emeritus of geology at Princeton University, suggested that the peak would come this fall. Dr. Colin Campbell, founder of the independent scientific organization, the Association of the Study of Peak Oil, believes that the peak has arrived. Many experts agree that the peak, which will only be clearly identifiable several years after it happens, will occur some time between 2000 and 2008. Others argue for a somewhat later arrival and a bumpy plateau rather than a peak, but most seem to agree that the peak of world oil production is likely to mark the beginning of radical changes in the way we live.

Oil is a very special substance. It is a very concentrated form of solar energy that took millions of years and unique geological circumstances to develop. By way of illustrating how concentrated the energy in oil is, it has been suggested that "the flare given off by igniting an ounce of charcoal starter lasts a few seconds, but the energy was derived from, say, a prehistoric tree fern absorbing sunshine for nine years." For another illustration, consider that it is possible to drive a compact car 6 km on the oil that would fill a pop can.

Oil is also highly portable and extremely versatile. It is used to fuel all manner of engines from chain saws and lawn mowers to cars, trucks, heavy machinery and jumbo jets. It gets made into a vast array of everyday items such as asphalt, plastics, fabrics, clothing, elastic, velcro, inks, paints, solvents, lubricants, fertilizers, pesticides, and paraffin wax.

Canadians annually consume more than 6 tonnes of oil equivalent per person. We are highly dependent on oil (and natural gas which is also facing an imminent production peak) for our food, heat, transportation and consumer goods. Our current diet for instance, is based on large inputs of fossil fuels during farming, manufacturing, and transport. It has been estimated that at least 10 calories of fossil fuel energy are used up in the production of every calorie that we eat. Most of the food we eat travels thousands of kilometers before arriving at our dinner table.

Demand for oil has been steadily increasing in Canada for some time. Global consumption has also been steadily increasing. Demand is increasing especially quickly in several rapidly-industrializing countries such as China and India.

World oil production follows a classic bell-curve pattern with a gradual increase early on, followed by a steep increase to the peak, a steep decline and gradual tapering off at the end. At the peak the world is “awash” in oil. There is more being produced and consumed than has ever been before or ever will be again. Past the peak, production declines sharply since much of the remaining oil is harder to get at (under oceans and Arctic tundra for instance), more difficult to extract and refine (from tar sands and oil shale for example) and therefore subject to diminishing returns in terms of the energy yield per unit of energy used for extraction.

Thus we are reaching the peak of world oil production at a time when our oil dependence is at a very high level, demand is increasing worldwide, and supplies are about to be sharply reduced. We can therefore expect the price of a barrel of oil to rise to several times its present level in the years ahead. So, while price spikes from Katrina are temporary, and prices may go up and down for several years, at some point in the not-to-distant future they are likely to begin an inexorable rise.

Unfortunately, alternative energy sources are not capable of replacing oil and gas at anywhere near the scale of our current consumption. Most alternatives are much less concentrated forms of energy, are less portable, less versatile, more expensive, and rely on oil at some stage of their production. Many alternatives will be used and will become increasingly important in the future, but no combination of known alternatives will allow energy consumption to continue at its present level.

Detailed analyses of the limitations of alternatives to fossil fuels are available on the internet. See page two of Life After the Oil Crash (www.lifeaftertheoilcrash.net); this site was the source of inspiration for Republican Congressman, beef farmer and scientist, Roscoe Bartlett of Maryland, who has recently made three hour-long speeches on “Peak Oil” in the American Congress; the speeches are on-line at www.bartlett.house.gov. Also see Energy Bulletin (www.energybulletin.net) and the Association for the Study of Peak Oil and Gas (www.peakoil.net).

Some names that people have coined for the difficult period we are now entering include the “Post-Carbon Era"", the "Long Emergency" and "Energy Descent". As oil becomes much more expensive, and rapidly becomes a scarce commodity, we will have to learn to use a lot less energy than we currently do. We will also have to endure a period of economic and social turmoil, since our economy depends to a great degree on abundant cheap oil for its functioning. On the positive side, our lives are likely to become a lot less hectic and more centered in our local communities where we will be more intimately involved with our friends and neighbours and more often engaged in meaningful pursuits than is now the case.

Some have seen this coming for a long time. M. King Hubbert, the Shell Oil geologist whose models are used today to understand the peaking phenomenon, stated in an article in the journal Science in 1949, that "the consumption of energy from fossil fuels is thus seen to be but a "pip", rising sharply from zero to a maximum, and almost as sharply declining, and thus representing but a moment in human history.” He then speculated on the impact of this "pip" on industrialized human civilization. He asked if we will make a transition to renewable energy, or "retreat to an agrarian civilization at a much lower population than present."

Saudi Arabians have also apparently seen the writing on the proverbial wall as indicated by a saying they have that goes "My father rode a camel. I drive a motor car. My son flies a jet airplane. His son will ride a camel."

Many positive responses to this challenge are possible. Around the world people in small communities like ours are beginning to develop action plans for energy descent; important initiatives include re-localizing the food supply and developing rural transportation networks. There are also many innovative ways of using both fossil fuels and renewable energy; the Ottawa Valley has many pioneers in the energy field, some of whom we will be profiling in coming articles.

As we begin to face and prepare for oil depletion here in the Ottawa Valley, we can also take some comfort from the fact that there is great tradition of helping your neighbour here and there is still a lot of traditional knowledge about getting along with less energy. Both of these bode well for how we will navigate the energy descent.

Additional references and recommended reading:
The Long Emergency by James Howard Kunstler, Atlantic Monthly Press. 2005
Power Down by Richard Heinberg, New Society Publishers, 2004

Lynn Jones is a member of the Ottawa River Institute, a non-profit charitable organization based in the Ottawa Valley supported by volunteers, local donors and a grant from the Ontario Trillium Foundation.

Ten easy ways to save electricity

14 Aug 2005 Lynn Jones

The main reason that consumers have done nothing to conserve is that we are totally in the dark as to the true cost of the electricity we are using.

We are only charged 5 cents per kWh for the first 750 kWh we consume in a month, and 5.8 cents per kWh for anything beyond that while the true price, is considerably higher than that. (A kilowatt-hour (kWh) is the amount of energy consumed by ten 100-watt light-bulbs burning for one hour.)

This summer has been very hot in Ontario and we have imported large quantities of power from the United States to keep air conditioners humming. On many occasions this summer our utility companies have been buying power for 10 or 20 times the price per kWh shown on our bill.

At the end of each month utility companies invoice the Ontario government for the difference between what they are allowed to charge us, and what they actually paid for the energy we used. And we Ontario electricity consumers blithely go our merry way, making extravagant use of artificially cheap power.

The government will not be able subsidize our electricity indefinitely. Eventually we will pay the true cost, and this will provide a much greater incentive to conserve.

In the meantime, here are ten ways to save on electricity at home. These simple strategies can save the average household two hundred or more dollars each year at current prices. Why not get into the habit of using them now, before the price goes up?

1. Replace incandescent light-bulbs with compact fluorescents.

2. Wash your laundry in cold water. This can save you $35 per year, and is easier on your clothes.

3. Use indoor or outdoor clotheslines to dry your clothes. Not using an electric clothes dryer can save $50 per year.

4. Lower the thermostat on your hot water heater from 70 to 55 degrees Celsius . .. Install a low-flow showerhead. These two changes can save you over $100 per year. (For some of us, these changes require the help of a handyman or handywoman friend or neighbour).

5. Turn off computers, especially desktops when they are not in use.

6. Pull the plug - Even when turned off, many appliances like televisions and VCRs continue to use small amounts of electricity for things like their clocks and remote controls.

7. Turn out lights whenever you are not using them. A light in an unoccupied place is 100% inefficient!

8. If you use air conditioning, higher temperature settings save considerable energy.

9. If you heat your home or apartment with electricity, lower settings can save 3 - 5% on heating costs per degree.

10. Weatherstrip and caulk - Most houses and apartments have small gaps around doors and windows that can be quickly sealed. Several hours of caulking can yield considerable energy savings.

Average monthly household electricity consumption varies widely in Ontario. One person in a small apartment might use 500 kWh or less ($25 worth at the artificial price). A family in a large house can use 4,000 kWh or more, depending on the size of the house, how many people live in it, and whether electricity is used for heating and hot water.

It is difficult to say how much you can save by making these ten simple changes, but here is an example: Two people in a 1000 square foot home with a gas furnace and water heater could drop their consumption by 50% from the average of 700 kWh per month, to 350 or lower.

There are many reasons to lower your electricity consumption: saving money now, preparing for future rate hikes, helping to improve air quality and limit global warming, or just reducing waste. Most utility companies offer extra incentives to cut power use as part of mandatory conservation initiatives recently undertaken province-wide in Ontario.

So... let's get saving!

The author is a member of the Ottawa River Institute, a non-profit charitable organization based in the Ottawa Valley. ORI is supported by a grant from the Ontario Trillium Foundation and local donors.

Conservation and renewable energy - for the little guy

10 Apr 2004

The blackout came when demand was peaking in Ontario and nearby U.S. states. Major industries such as auto manufacturers closed, creating billions of dollars of economic losses. The problem dragged on for days as Ontario Power Generation struggled to get nuclear plants back on line after unplanned shutdowns.

The immediate response was a lot of finger pointing. Who was to blame - New York? Ontario? Ohio? Next came those saying, "Don't worry, the system is fine. We need a bigger power grid and more generating plants. Privatization is working, just give it time."

Large, centralized power plants contain the germ of their own destruction. To recover investment costs, electricity sales are promoted. Demand rises, prices soar. The system quickly returns to gridlock.

But now, thoughtful voices are emerging. They are offering solutions to make our energy future more secure, decentralized, and democratic. Government action can lead to more jobs, income for farmers, cleaner air, and reduced household expenses.

A recent study by the David Suzuki Foundation, "Bright Future: Avoiding Blackouts in Ontario," examines how California avoided system collapse after a failed utility deregulation experiment in the late 1990s. By summer 2001 California was on the verge of major blackouts. But the government, utilities and citizens moved quickly to reduce summer peak load demand by roughly 5,000 megawatts.

Conservationists have long claimed that conservation is cheaper and faster than adding generating capacity. The California experience proves this. Conservation, at 4.5 cents per kilowatt hour, easily beat the 6 cents or more per kilowatt hour for plant construction.

California utilities had been leaders in conservation since the first energy crisis in the 1970s. When they were again made responsible for long-term investment in system maintenance and efficiency, they and the public responded.

While there was no magic bullet, the government's "20-20 program" was a huge success. One third of Californians cut their electricity use by 20 per cent to qualify for a 20 per cent rebate on their bill.

Energy efficiency standards helped Californians save more than $15.8 billion in electricity and natural gas costs, according to the Suzuki Foundation report. The strategy is simple: provide incentives for buyers of energy efficient homes and appliances, increase market share, and gradually build higher standards into regulations.

California also has a dedicated research fund financed by an electricity surcharge. Even after large gains in conservation technologies have been made, new discoveries keep emerging that yield further dividends and create new jobs.

Energy planning in California is done in a more transparent and democratic fashion than in Ontario. The public understands energy issues and choices. Public support is high for a more decentralized power system that is less vulnerable to failure, and for cost-effective investment in energy efficiency.

California was the first place in the world where wind power was adopted on a significant scale. Europe now leads in wind technology by use of two key legislative strategies: Renewable Portfolio Standards and Advanced Renewable Tariffs.

The Ontario government has signaled its intent to legislate an increase in the province's share of renewable energy generation to 8% by 2014. The Suzuki report proposes a more ambitious Renewable Portfolio Standard target of 10% by 2010 that would require federal support.

Advanced Renewable Tariffs would allow rural landowners to connect wind turbines to the grid without a lot of paperwork, while guaranteeing a fixed price for a fixed period of time. Paul Gipe, head of the Ontario Sustainable Energy Association, estimates that if half of Ontario's farmers installed a 1-megawatt wind turbine, they could add four billion dollars to the rural economy and produce one-third of the province's electricity.

The time for conservation and renewables is now.

Ole Hendrickson is a member of the Ottawa River Institute, a non-profit, charitable organization based in the Ottawa Valley.

A better energy future for Ontario

03 Apr 2004 Lynn Jones

As a province, we currently consume about 150 billion kilowatt-hours of electricity each year. Peak demand is about 25,000 megawatts (MW) on hot summer or cold winter days. About a quarter of our electricity comes from hydro, about a third from aging and unreliable nuclear plants, and about a quarter from coal plants. Peak demand is forecast by the Ontario Ministry of Energy to rise another 6,500 MW by 2020.

Our nuclear reactors are wearing out sooner than expected. Long delays and enormous cost overruns have become the rule rather than the exception when it comes to building or refurbishing them. High level nuclear waste continues to pile up and the price tag for dealing with it is already in the billions of dollars.

Underperformance of Ontario's nuclear reactors has led to increased use of coal. Burning coal to generate electricity produces large quantities of greenhouse gasses, and releases toxic pollutants such as nitrogen oxides, sulphur dioxide, mercury, and lead, thus increasing smog, adverse health effects, and climate instability. For these reasons, the current government has promised to phase out coal plants in 2007.

Fortunately there is a sustainable way out of this situation. And the timing couldn't be better. For the world is in the process of an energy revolution right now, beginning to shift from a carbon-based system to one based on renewables and hydrogen, according to Lester Brown, president of the Earth Policy Institute in Washington D.C. Brown says the only questions about the energy revolution are how rapidly it will unfold, whether it will move fast enough to prevent climate change from getting out of hand, and who will benefit most from the transition.

One part of the energy revolution can be seen in the rapid expansion of wind electric generation. Over the last decade wind has been the world's fastest-growing energy source. New advanced-design wind turbines are able to generate electricity from wind very cheaply. Wind turbines now supply enough electricity to satisfy the residential needs of 40 million Europeans. Germany recently installed 3000 MW of wind generation in one year alone!

A recent assessment of global wind resources by the European Wind Energy Association concluded that the world's wind generating potential is double the projected world electricity demand in 2020. Lester Brown points out that the researchers used conservative estimates of land available, and did not count offshore potential. In his words "It seems likely that wind power could satisfy not only world electricty needs but perhaps even total energy needs."

What does this mean for Ontario? According to the Ontario Sustainable Energy Association, Ontario could generate 8,000 MW from wind by 2012. The long-term future is even brighter. According to a recent report of the David Suzuki Foundation, offshore wind potential in Lake Erie alone is estimated at a level sufficient to satisfy 98% of Ontario's 2001 electricity demand.

With the electricity from wind, would come additional benefits - local income and jobs. For example, Lester Brown points out that one large advanced-design wind turbine, occupying a quarter-acre of land, can easily yield a farmer $2000 (U.S.) in royalties per year while providing the community with $100,000 of electricity.

What else can Ontario do to get through the energy crunch? The Ontario Clean Air Alliance recently developed a low-cost, low-risk electricity supply strategy for Ontario that is endorsed by a large number of energy providers, consumer and environmental groups. The strategy recommends energy conservation and efficiency, renewables (water, wind, solar and biomass), cogeneration and high efficiency natural gas power plants. According to OCAA, the combination could easily meet all of Ontario's electricity needs by 2020.

All we need now is political will.

Lynn Jones is a founding member of the Ottawa River Institute, a non-profit, charitable organization based in the Ottawa Valley.

Let's generate some negawatts

01 Apr 2004 Lynn Jones

Negawatt (n) - a measure of energy efficiency; a unit in watts of energy saved.

"Every negawatt generated has the potential to increase our wealth and health as few other investments can. Negawatts enable us to do more with less and the opportunities are almost boundless. Energy efficiency is the great new energy resource of our future and a vital key to a sustainable environment."

The word "negawatt" was coined by Amory Lovins, a Harvard and Oxford-educated experimental physicist who is CEO of the Rocky Mountain Institute and a Time Magazine "Hero of the Planet". In 1989 Lovins gave the keynote address at a Green Energy Conference in Montreal. You can read this fascinating address on the web; it is called "The Negawatt Revolution: Solving the CO2 problem".

Lovins makes the case, very persuasively, that enormous amounts of energy are wasted in North America. ($300 billion per year in the U.S. and $30 billion per year in Canada) By increasing our energy efficiency

we can "generate" large amounts of power without building any new power plants or buying any fuel for existing plants.

Although spoken 15 years ago, Lovin's words and recommendations are just as relevant now if not more as Ontario struggles to avoid a looming energy crisis.

Here's an example of negawatt generation: Compact fluorescent light bulbs are widely available in many sizes and shapes. They are generally four times more efficient than regular light bulbs (14 watts replaces a 75 watt incandescent) and last ten times longer.

"Think of such a compact bulb, with 14 watts replacing 75, as a 61 negawatt power plant. By substituting 14 watts for 75 watts, you are sending 61 unused watts -- or negawatts -- back to Hydro, who can sell the electricity saved to someone else without having to make it all over again", says Lovins.

According to Amory Lovins, although they aren't glamorous, the thousand or so best electricity-saving innovations now on the market, if fully used throughout the United States, would displace over half of all the electricity the country now uses. And the potential for saving is similar or greater in Canada.

Conservation has tremendous potential to help avoid a severe energy crisis in Ontario as indicated by experience in California. Per capita energy consumption in California has remained the same since the 70's while it has risen substantially in most other places. This is due to early and sustained emphasis on energy conservation. Over the past 20 years, California's energy efficiency programs have saved 10,000 megawats of power. This is the equivalent of 20 large power plants.

Governments need to do their parts by creating incentives for conservation, and improved standards for buildings and appliances. But there is certainly a lot that individuals can do in the meantime.

There are many ways to save energy in your household. If you haven't already, you could start by replacing your most used incandescent bulbs with compact fluorescents. Then check out "25 cheap and easy ways to save energy" on the website of Toronto's "Greenest City" organization. You will find many good ideas in an excellent pamphlet called "Energy-Savers" on-line at the U.S. Department of Energy. National Resources Canada's Office of Energy Efficiency also offers information on-line.

Lynn Jones is a member of the Ottawa River Institute, a non-profit charitable organization based in the Ottawa Valley.

Sawdust and pellet stoves

26 Mar 2004

University of Ottawa law professor Jamie Benidickson has written a brilliant account of the "Sawdust Menace" that threatened the Ottawa River in the 1800s. In 1867, federal MP Richard Cartwright introduced a law to prohibit the disposal of sawdust and other mill wastes in navigable streams and waterways. A commission was formed. It found places where piles of sawdust obstructed the entire river. In 1873, after great debates between lumbermen and politicians, legislation was enacted.

Lumberman J.R. Booth, the subject of the first successful prosecution under the law, was fined $20 in 1875.

Problem solved? Hardly: The timber barons continued to dump sawdust under exemptions in the act until 1895. J.R. Booth asked for further delays, claiming he would soon open a pulp mill and use the sawdust as fuel. In 1901 the government got another conviction and another twenty dollars from Booth. Finally, Prime Minister Sir Wilfrid Laurier intervened personally and Booth agreed to cease dumping sawdust in1902.

Fast forward to 1984: The Newfoundland Department of Environment issues a policy directive on sawmill wastes. It states, "Many of the sawmill operations across the province contribute to water pollution through poor or non-existent waste disposal practices. Attempts... to promote cleanups have met with little success and it is now necessary to renew such efforts with follow up through to prosecution where the owners continue in violation of environmental legislation."

Onward to 2004: Randy Hillier, President of the Lanark Landowners' Association, criticizes the Ontario Ministry of Environment's efforts to address sawdust. He says "The forestry industry is facing a blitzkrieg of environmental regulations and closings... MOE SWAT teams seek out rural sawmills and burden them with large fines and expensive work orders, and demand sawmills hire consultants, engineer work plans, and drill test wells, which cost tens of thousands of dollars. The offence is bark, mulch, and sawdust piles..."

We've been trying to fix the sawdust problem with environmental regulations for more than 135 years, with no end in sight. It's questionable whether sawdust is even worth all the energy focussed on it by government bureaucrats. But rather than debate that here, I'd like to raise the possibility of another approach: wood pellets.

Pellet stoves are modern technology, dating from the 1970s. Fuel pellets made from sawdust are fed automatically to a burner, with feed rate determining heat output. Advanced models have a computer and thermostat to govern feed rate. Exhaust gases are vented through a small flue out a side wall or through the roof. Pellet stoves burn cleaner even than advanced wood stoves. The higher cost of the stove itself is offset by lack of a chimney. Pellet stoves require electricity, though consumption is small. Batteries can provide back-up power.

Wood pellets cost more than firewood, but this is offset by cleanliness, ease of fuel handling and automated feeding. Pellet fuel is sold in 40 pound bags at about $5.00 each, or about $250.00 a ton. A ton of pellets is equivalent to about 1.5 cords of firewood.

But the real competition is between wood pellets and fossil fuel. Rick Bradshaw of Performance Woodburning in Pembroke, Ontario, says pellet stove sales have risen in recent months as prices of propane, natural gas, and oil have gone up.

Demand for wood pellets is growing. An ample supply of renewable biomass exists for their manufacture. One group of government bureaucrats wants to get rid of sawdust. Another group of bureaucrats wants to reduce fossil fuel burning.

Maybe it's time for them to talk to each other.

Maybe we all need to think a little harder about "waste". As Professor Benedickson says, "We have the technology and the wealth to at least make a good start on beating pollution. But we have no collective commitment."

Ole Hendrickson is a member of the Ottawa River Institute, a non-profit charitable organization based in the Ottawa Valley.

The wind energy revolution

12 Mar 2004

In 1992 the U.S government estimated that three states - North Dakota, Kansas, and Texas - could satisfy all the electricity needs of the U.S. Advances in turbine technology have changed this picture. Taller wind turbines operate under higher and more reliable wind speeds, and generate electricity more efficiently. Today, according to Brown, those same three states could satisfy U.S. energy needs for transportation as well as electricity.

Of all U.S. states, Texas has the most rapid increase in wind energy development. Along the interstate highways are rows of wind turbines interspersed with rows of oil wells. The energy transition is in full view. According to Brown, 30 years from now the turbines will be turning, but the oil wells will be still.

California was promoting wind electricity when costs were $.40 per kilowatt-hour. Today the average is $.04 per kilowatt-hour, and could go to half that by 2010.

Cheap electricity from wind could also power cars by producing hydrogen fuel from water. Kits already exist to convert cars from gasoline to hydrogen fuel. Every service station has electricity and water. All one needs is an electrolysis unit and a compressor.

Hydrogen can be generated from any existing source of electricity, but Brown says it is cheapest to use wind. With ample wind capacity installed, hydrogen could be generated at night. When the wind slackens, natural gas or hydropower are logical choices for back-up power, as turbines can be quickly started and stopped to match variations in demand.

Europe is moving very fast on the wind front. At the end of last year, wind supplied the electricity needs of about 30 million Europeans. Brown says that the goal there is to supply 195 million people, or half the population, by 2020. Europe has far less wind per capita than North America. Canada probably has the highest wind resources per capita of any nation in the world.

The secret of quick restructuring of the energy economy is to get markets to tell the truth. All of us - consumers, government planners, politicians, investment bankers - rely on market signals to tell us how to spend money.

These signals don't include air pollution and its health costs, acid rain, and climate change. Brown suggests that a good start would be to lower income taxes while increasing taxes on carbon emissions.

With government leadership, the transition to wind energy could be very fast. Brown points out that within four months of the Japanese attack on Pearl Harbor, the U.S. had fully shifted into military production. Between April 1942 and December 1944, the auto industry produced no cars, but was totally focused on planes, tanks, ships, and artillery. Today, slack capacity in the auto sector could be quickly retooled to produce wind turbines. Many turbine components - gear boxes, electronic controls, and so forth - are quite similar to auto components.

Asked about the NIMBY - "not in my back yard" - syndrome concerning wind farms, Brown pointed to the PIMBY syndrome - "put it in my back yard". When a western U.S. utility announces a new wind farm the competition is intense. Ranchers can earn far more from wind than from cattle. Local communities want the contribution to the tax base. Brown predicted that as people get to know wind turbines better they will become more acceptable.

Can Canada afford to "go it alone" in a transition to a wind energy economy, when the U.S. seems wedded to fossil fuels? Brown pointed out that Denmark's early adoption of wind technology has made it an economic powerhouse. He said that Canada could also be "going like gangbusters" with wind, and could use that to lead the hydrogen economy as well.

Ole Hendrickson is a member of the Ottawa River Institute, a non-profit charitable organization based in Pembroke, Ontario.

Make friends with your electrical meter

21 Sep 2002 Lynn Jones

Recently I sat in on a workshop with elementary school principals, custodians and grade 5 teachers from the Renfrew County Catholic School Board as they learned about energy conservation as part of the Destination Conservation program. At the end of this workshop, we all learned to read electrical meters.

The workshop leader, an affable former teacher named Ian from the Dearness Environmental Society in Toronto, introduced the subject by bringing a meter into the meeting room. He explained that horizontal disc inside the meter rotates a set amount for each watt of energy used. He then plugged a portable fan into the meter and a volunteer from the audience reported that the horizontal disc was barely moving. Next Ian turned on a heater plugged into the meter. At once, the disc started whirling around quite quickly.

Ian went on to explain more about meters. A meter records the energy used by all the electrical circuits in your home (or school). The meter has dials which look almost like clocks. (Some meters have four dials, some have five dials).

Meter reading can be tricky. It helps to remember these rules:

- The dials are like watch faces. BUT every other dial moves counter-clockwise.
- Always read the faces and record the numbers from right to left .
- If the pointer is between two numbers, always record the number it has just passed (this is the smaller number, except when passing from 9 to 0: the 0 represents a 10 in this case).

If you take two readings one week apart, and subtract the smaller figure from the larger one, you will have a figure for your total kilowatt hour consumption for the week. Once you have calculated a week's normal consumption, you can monitor the effect of changes in your electricity use. Spend the next week turning off lights when no one is in the room, washing your laundry in cold water, or turn the thermostat on your hot water heater down. Then take another reading, subtract the previous week's reading from it, and see how much less energy you used. Multiply the difference by the cost of a kilowatt-hour (4 cents) to see how much money you saved.

This is exactly what the students in Renfrew County Catholic District School Board's schools are doing - reading meters and seeing how much energy the school can save by turning off lights and computers when not in use. Apparently the average elementary school can save about 5% on its utility bills (which can amount to more than $1000 per school in a one-year period) just by conserving energy.

The Destination Conservation program is sponsored by the Ottawa River Institute, with support from the Ontario Trillium Foundation and Enbridge Gas Distribution.