



PURE



Watts Up?

#2 - Winter 2005

Newsletter of **PURE - the Power Up Renewable Energy Co-operative**
Renewable Energy and Conservation for Dufferin County and the Headwaters Region

www.powerupenergy.ca

Conference Announcement

Energy and Education: "Setting the Cornerstone for a Sustainable Energy Future" Shelburne, Ontario, October 2005

The PURE-CDDHS Coordinating Group is pleased to announce this exciting full-day conference event, which will bring together educators, political leaders and entrepreneurs interested in alternative energy education. This gathering will help to promote new initiatives in the educational system to deal with the key energy challenges facing the Province of Ontario. Stay tuned to the PURE website for details about the **Energy and Education Conference**, and the "**Green Power Project**" - the first solar and wind powered renewable energy system to be installed at an Ontario high school. ☺

Wind Monitoring Program for Dufferin County Proposed

by Rick Dewsbury

Most of us know that wind in Dufferin County is a major untapped resource, likely to become increasingly valuable in the near future. We believe that wind electricity generation has the potential to produce large economic benefits. Dufferin County must decide how best to manage this resource for the benefit of its residents. In order to do this, County and municipal councils need accurate information about the extent and value of the wind resource in our region.

(continued on page 4...)

Celebrate Earth Day! and "Green Power"

Join us on Earth Day, April 22nd, at CDDHS: Centre Dufferin District High School, to celebrate completion of the **Green Power Project**. Phase One of the PURE-initiated renewable energy demonstration project at CDDHS in Shelburne is now in place and we are on track to complete the full wind and solar powered system by **Earth Day, 2005**. Stay tuned to the PURE website for details!

CDDHS Update

by Randy Dryburgh

Both the high school and the Upper Grand District School Board were excited last year when PURE proposed the idea of an on-site renewable energy system. In fact, our expectations have already been exceeded!

(continued on page 3...)

Got Wind?



On January 15th, PURE and the DCMA, Dufferin County Museum

and Archives hosted "**Wind Power on Your Property**", a 2-hour seminar featuring the very much in-demand **Dr. Jim Salmon** of *Zephyr North*, who has over 15 years of experience in providing wind resource assessment services to the energy industry.

Dr. Salmon's technical and informative talk (see our **Page 2 Review**) illustrated the major factors for site selection and wind measurement...(continued page 2...)

Join the **PURE Wind Development Committee**
First meeting: **April 2** (see page 4 for details...)

Do The Math! RETScreen: New Tool for Project Analysis

by David Lutka

After looking into various renewable energy projects I soon came to realize how much work was involved in trying to calculate and justify their expense. Collecting all the necessary information and tailoring it to my specific goals was difficult and time consuming. Fortunately, **Natural Resources Canada** has developed a **free** and extremely comprehensive software system to ease this task, called "**RETScreen**", a case-study-based tool that helps any project planner better analyze the technical and financial viability of potential renewable energy projects. (continued on page 3...)



Wind Talk - Review *by Richard Procter*

Here's what I took away from the excellent talk by Dr. Jim Salmon of *Zephyr North*, at the PURE public meeting on January 15th. Basically, there's a lot of math involved, and numerous things to consider when trying to obtain power from the wind. Here's the main formula used to calculate wind "power density", a critical measurement when analysing your power potential:

$$\text{Power Density} = 1/2 \times (\text{air density}) \times (\text{wind speed})^3$$

What's important in this formula are the *relative terms*. Note that power increases linearly as air density rises, but increases geometrically (cubed) as wind speed rises. So double your windspeed, and your power factor increases by 8 times! A small, sustained windspeed advantage, gained for example by a higher tower or better location, could make all the difference for commercial success. As well, air density apparently can vary by as much as 40%, depending on temperature and pressure. Cold winter winds are much better than summer breezes.

Our formula can be expanded:

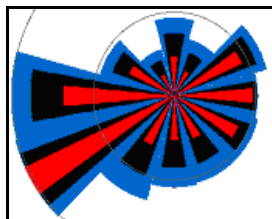
$$\text{Power} = 0.5 \times (\text{air density}) \times (\text{wind speed})^3 \times (\text{rotor area}) \times (\text{various efficiency factors})$$

Those factors include things like generator and gear-box efficiencies, but note the other term. As rotor area increases, your power increases in linear fashion too (eg. double the rotor area, double the power). And don't forget that a wind turbine's rotor area is a function of the *square* of the blade radius, so double the radius, and you quadruple the area!

Anyway, enough math. The other factors that Dr. Salmon talked about included topography and surface roughness. Smooth, like the surface of a body of water for example, is way better than rough, like a village or forest. This factor can affect your power capture by quite a bit, and explains why the best sites for wind farms in Ontario are near or in the Great Lakes. Obstacles, such as barns and trees, can be critical for turbine placement, so stay away from these if possible.

Topography takes into account such things as hills and valleys, slopes and ridges. Locating on a ridge which is perpendicular to the prevailing wind is usually best. Ridges are better than hills, because the wind can't just flow around them. Moderate slopes facing the wind are good too.

Dr. Salmon's talk then covered numerous details about measuring the wind at your site using sophisticated towers and monitoring equipment, more work perhaps than most people are prepared to do, but essential if you are considering a commercial ➤



A "wind rose" diagram illustrates windspeed and direction over time.

operation. Some better wind maps and data are becoming available from government sources, and several books are on the market to help the do-it-yourselfer in this process. Author and wind advocate Paul Gipe, for example, has published two excellent books on wind power- check out his website: www.wind-works.org for details. ☺
PS. for further info, visit Dr. Salmon's *Zephyr North* website, at: www.zephyrnorth.com



Got Wind? *(from Page 1...)*

...in preparation for any wind power project, large or small. Dr. Salmon



also talked about the interpretation of data collected from wind monitoring towers and equipment, costs, pitfalls, and spent a few minutes outlining the steps one needs to take to assess a local wind resource, using the Museum itself as a "ground-zero" example.

The event was packed to capacity, over 100 people attended, and PURE sincerely regrets having to turn away a large number of people who had hope to get in and hear the talk. We encourage all those interested in keeping up with developments in the wind industry and those doing their own wind power investigations, to **join PURE**, and stay tuned for our next educational event. We hope we can repeat Dr. Salmon's talk, or something similar in the near future for those who missed out! ☺

Power Up Renewable Energy Co-op - Contact List

<i>Title or Committee...</i>	<i>Please contact...</i>
Board President	Don Hayward - (519) 925-3286
Vice President/Political	Rob Strang - (519) 941-9013
Secretary/Networking	Jeff Gold - (519) 942-3978
Treasurer/Finance	Goetz Koechlin - (519) 942-4724
Business/Fundraising	Tony Howard - (519) 925-0337
Education	Theresa Sauren - (519) 942-2075
Education	Aurora Hayward - (519) 925-1455
Networking	Matthew Fairlie - (519) 925-0521
Purchasing	Andrew Gilbert - (705) 466-6920
Technical	Terry Williams - (519) 942-3272
Technical/Wind	Rick Dewsbury - (519) 925-6528
Technical/Wind	Chris Kotwas - (519) 925-1710
Micro-Hydro	David Lutka - (519) 942-0642
CDDHS Project	Randy Dryburgh - (519) 323-1074
Newsletter/Media	Richard Procter - (705) 434-1175

WWW.POWERUPENERGY.CA

Power Up Renewable Energy Co-operative
5 Fead Street, Orangeville, Ontario, L9W 1A6
tel: (519) 925-3286 (Don Hayward - President)
email: info@powerupenergy.ca

Our Mission

Power Up Renewable Energy Co-operative is a non-profit, all-volunteer group with a mission to create a "community based energy strategy" in Dufferin County and the Headwaters region, established on the principles of encouraging sustainable and responsible energy generation and use.



CDDHS Green Power *(from Page 1...)*

Students are learning to monitor what they now call the "**Green Power Project**" on an ongoing

basis, conduct tours for other students and members of the community, collect data and gain valuable hands-on experience with a working renewable energy system. Teachers in the Science and Technology departments are working with PURE members to develop curriculum materials focusing on energy conservation and renewable energy technology, and make the best use of the system.

PURE Board members **Matt Fairlie** and **Randy Dryburgh**, along with **Jeff Wellman**, Assistant Head of Science at CDDHS, have coordinated the effort to get the system up and running. When completed, the system will consist of 0.5 kW in photovoltaic (PV) panels, 7kW of battery storage, a 1.5 kW wind turbine on a tilt tower, a grid connection using a "net meter", a power inverter and other monitoring equipment.

Many other generous supporters donated time and materials to make this project happen, and we thank them for it. In particular, electrician **David Lutka** was instrumental in getting us to this point. He gave up much of his after-hours time to help with various installation tasks. Not only that, but he took on a leadership role in the project, getting students involved, spending many hours to coordinate their efforts, and that deserves special mention.

The completion of **Phase One** of the project - 12 PV solar panels, battery storage and energy monitors, was celebrated at a public meeting at the school on Nov. 30, 2004. Students from the school **Environmental Club** chaired the event, which included tours by the Physics class students who helped install the PV array. Other partners who have supported the Green Power Project include the UGDSB, Hydro One, Canadian Hydro Developers, the Fairfield Group and Fines Hardware, all of which were on hand for the celebration, as was Brampton-area MPP Linda Jeffrey. The student hosts read letters of support from the Minister of Energy, the Minister of the Environment and the Canadian Ambassador for the Environment, and they distributed Green Tags to the partners who supported the project. Each Tag represents the one Kg of CO2 that will be avoided for each kWh the Green Power Project produces, once it is connected to the grid.

The PURE-CDDHS Coordinating Group are presently working with Hydro One on connecting the system to the Ontario power grid and the installation of a "**smart meter**" which will allow computerized monitoring of energy use in the school. Soon, the wind turbine will be mounted on the roof of CDDHS, with target date for full operation at the end of March.

Everyone involved with the Green Power Project ➤

Do the Math! - RETScreen *(from Page 1...)*

RETScreen helps to determine if Renewable Energy TechnologieS (RETS) are viable at the critically important planning stage.

Formally, "**RETScreen International Clean Energy Project Analysis Software**" is available via the internet and CD, and is a unique decision support tool developed with the contribution of numerous experts from government, industry, and academia. The software, provided free-of-charge, can be used world-wide to evaluate the energy production, life-cycle costs and greenhouse gas emission reductions for various types of RETS. The software also includes product, cost and weather databases; and a detailed online user manual.

RETScreen can significantly reduce pre-feasibility costs. Renewable energy topics include:

- Wind Energy ➤ Small Hydro ➤ Photovoltaic (solar electric) ➤ Solar Air Heating ➤ Biomass ➤ Solar Hot Water ➤ Passive Solar ➤ Ground Source Heat Pumps

and RETScreen software also provides:

- Product data, with over 1000 suppliers represented
- Weather data from over 1000 ground stations
- Satellite-derived surface meteorology and solar data
- Background on the different technologies, with over 50 international case studies of real world projects
- Greenhouse gas emission info
- Financial analysis calculations

Training and technical support is provided by an international network of certified RETScreen trainers. Version 3.0 upgrades include a metric/imperial unit switch; updated product data; an enhanced GHG model to account for the emerging rules under the Kyoto Protocol; and a new Sensitivity & Risk Analysis worksheet. The **Wind Energy and Small Hydro Project Models are now available**, with the other existing technology models to be upgraded. RETScreen now has more than 48,000 software users in 202 countries around the world and is growing at 200 new users every week. ☺



Need more help with RETScreen?see page 4

hopes it will inspire other schools to follow this example or to find their own ways to promote alternative energy applications. There are plenty of flat school roofs out there just begging to be covered with solar panels or wind turbines! Our upcoming April 22, **Earth Day "Ribbon Cutting"** event will celebrate and showcase the complete installation of the Green Power system at CDDHS and kickstart these objectives in a big way! Stay tuned! ☺

Wind Monitoring for Dufferin *(from Page 1...)*

Therefore, a PURE committee has been struck to investigate the establishment of a wind monitoring program in Dufferin, and we invite those members interested in this initiative to get involved. The monitoring program will benefit many stakeholders in Dufferin County. These including Municipalities, farms, business and residents considering wind systems.

In our proposal, Stage 1 of the program will consist of wind monitoring equipment and data loggers, situated on an existing tower structure in the target area. This set-up will produce a continuous log of wind direction and strength for one year. Data will be collected at 3 levels, between 10 and 46 meters (30 to 150 feet).

Later, the equipment would be moved to other locations. It would make use of existing towers where feasible but eventually might require the purchase of a tower. Analysis of the data will provide information about wind energy (kilowatt hours) per year, wind velocity ranges (used for turbine selection), captured at 3 height levels.

In terms of needed equipment resources, these would include 3 wind metering devices, a data logger, radio modem with base station, one PC, an Internet account, a telephone connection and a web site. Required personnel will include 3 to 5 volunteers to mount the hardware on the tower then monitor the data and provide access to the data through the Internet.

Accurate wind data will aid PURE members in ➤

establishing small-scale wind installations. By working together we can develop a plan to gather this essential data, which will be useful for many projects to come. Wind is a community resource, and it's up to those of us who live here to make sure it is developed in a way that benefits all community members.

For more information, or to join the PURE wind monitoring committee, contact Rick Dewsbury at 519-925-6528.☺

Get in on the Action...

New: Wind Development Committee Meeting April 2nd, 9:30am to 12:30pm Shelburne Public Library

This new PURE committee will host its first meeting for those interested in discussing wind power in their community - specifically, a **project to build large wind turbines**. For more info please contact Chris Kotwas at 519-925-1710.

!! PURE Members Benefit !!

The RETScreen software (*see page 1*) can be downloaded for free at www.retscreen.net. But if you have tried the software and are having trouble or if you are just interested in having a potential project assessed, PURE's own **David Lutka** says he may be able to help out. David has taken the RETScreen training program and has worked through many of the case studies. He can be reached at dlutka@primus.ca, or 519-942-0642.



Agnes

(Agnieszka) Cudziel
Sales Representative

RE/MAX

Select Realty Ltd., Realtor
Independently Owned & Operated

942-8700

or 1-800-461-2686

Service you can count on!



FREE RECORDED
INFO. CALL

1-866-875-7168

& enter property id#
(see individual ads).



Energy Workshop

Living Off the Grid

March 4 to 6

Learn what the experts know about:
Passive Solar Design <> Radiant Heating
Solar Water Heating <> Energy Efficiency
Emergency Power Systems <> Wind Power
Wood Heating <> *a workshop at the*

Ecology Retreat Centre

Hockley Road, Orangeville

(519) 941-4560

ZERODRAFT

Cozy Home Corner

By The Zerodraft House Doctor

The Zerodraft House Doctor will share some great ideas about how to make your home more comfortable and reduce heating bills during our long winter. Many of the measures will be pretty straightforward for DIY types, and for those trickier tasks, you can contact Zerodraft to find out where best to go for help.

ZERODRAFT (www.zerodraft.com) is a resource that brings together both products and affiliated building envelope improvement service contractors. ZERODRAFT Authorized Applicators include many different kinds of small and medium-sized companies in both the residential and the industrial, commercial and institutional/public sector markets. Many have a background in insulation, renovation, heating and air conditioning, energy conservation or even roofing, siding or windows. Zerodraft offers comprehensive weatherization training, premium products and marketing support. ✎

1. Stop drafts, keep warm and save money!

They say it's an ill wind that blows no good. But I don't know what's good about the cold draft that runs down my neck while I'm sitting in my friend's rec room lazyboy watching TV. Now I'm not about to blame my friend for his house having a draft, after all, most people have one or two. I'd just like to make sure you, and he, know how easy it is to fix them.

Three things make cold air blow around in a house.

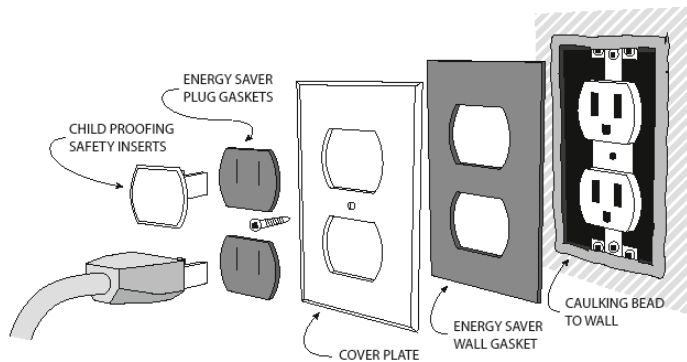
First, warm air rises; that means the space that it leaves below itself can only be filled by air from somewhere else. Think of a chimney and you'll get the idea. If you have air at different temperatures in the house, this effect will cause a continuous circulation of air...otherwise known as a draft.

Second, wind blowing on the outside creates a pressure that tries to suck everything toward the lee or far side of the house. This includes air, which, when it moves, you've got it, is called a draft.

Third, if you have forced air heating or air conditioning, you're blowing it around on purpose. If this air is not as warm as you want it to be it will feel like a cold draft.

To stop all of them you first have to limit the amount of air traveling in and out and around your home. Check and replace if necessary the weatherstripping around the windows and doors. Run a bead of sealant under the windowsills and around the frame. Put gaskets behind electrical outlets. Squirt foam behind the baseboards. You'll also want to check insulation both in your basement, if you have one, and on the floor of your attic. Remember, insulation by itself will not stop drafts, especially if it's glass fiber. If you've got heating ducts in the attic, you'll need to insulate them for sure.

As we go, we'll be covering each of these comfort improvement ideas in detail and describing the materials you'll need. You can look forward to a more comfortable home plus lower fuel bills. ✎



2. Seal Electrical Receptacles to Stop Drafts!

Improve comfort and save energy in your home

Almost everyone has experienced the discomfort of a cold draft around the ankles. That chilly air that attacks your toes can make you feel cold all over, and of course, any time you have to turn up the heat in your house to stay warm, you're spending more money on energy too.

Sealing electrical receptacles on both the interior and exterior walls of your house can help reduce drafts and air leakage, as well as the risk of condensation and mould formation within the walls. It also helps to childproof the receptacle by preventing small fingers from poking around inside.

It's a relatively simple project suitable for even a beginner Do-It-Yourselfer. **Before you start, make sure the power is switched OFF.** You'll need a flat-head screwdriver, a caulking gun, some paper towels and thin rubber or plastic work gloves. For materials, you'll need energy saver gaskets and childproofing safety inserts. You'll also need clear, low residual odour, paintable caulking like siliconized latex.

Once the power is off, your first step is to remove the cover plate from the receptacle. Apply a thin bead of caulking to the back of the gasket, then stick or embed the gasket on the wall over the receptacle or switch. Make sure that the caulk seals the flanges at the top and bottom of the receptacle, then wipe away any excess caulking with a paper towel and re-install the cover plate. Make sure you save the punch-outs from the gaskets, because you're going to use them later on.

For rectangular shaped switches and receptacles, you'll need to use a switch gasket and cut it to fit using a utility knife. For multiple or over-size switches, you'll need to overlay the gaskets, cut off the excess with your utility knife and seal the join with caulk to make it airtight.

Remember the punch-outs from your energy saving receptacle gaskets? Use these as plug gaskets to cover the ground pin holes in the receptacles by installing them on the prongs of the childproofing safety inserts. They can also be installed directly onto the prongs of any two-pin plugs that are always plugged in.

Once you have your gaskets caulked into place and your punch-outs installed, the last step is to turn the power back on.

This simple, quick and low-cost comfort improvement project can help make your home cozier and safer. It can also help you save money on energy bills and woolen socks. ✎