

Renewable Energy NEWS

Climate Change & Energy in NB

Fall 2007
Volume 4 Issue 2

Falls Brook Centre

The Falls Brook Centre works to help Canadians and international partners make the transition to sustainable living

Check out our green heating workshop to learn more about saving on home heating costs.

More information
www.fallsbrookcentre.ca/technology/

CONTENTS

Page.....1

It's Hard to Say
-Falls Brook Centre update.

Page.....2

Transmission Lines Are Cool, But...:
-questioning distributed electricity

Page.....3

Energy Experience

Page.....4

Profile:
Sunwave Energy

Contacts:
-Learn more at FBC renewable energy

Energy Empowerment Workshop

The Falls Brook Centre is hosting its final workshop this summer for people looking to learn more about renewable energy technology. The green heating workshop is scheduled for September 22nd and 23rd at the Falls Brook Centre in Knowlesville, New Brunswick. Lunch is included and overnight accommodations available. Students half-priced.

For more information about pricing or to register:

Call: 506-375-4310, or Email: technology@fallsbrookcentre.ca

It's Hard to Say

IT's HARD to write these words, but fall is nearly upon us. Now, with the band-aid peeled off, so to speak, its time to take stock of our accomplishments for the summer and make way for the new ventures that await us in the fall.

It's been a busy summer for the renewable energy team! The summer renewable energy workshop circuit is nearly at its end with two workshops successfully completed and one more to come.

Our first workshop, focusing on solar energy, featured the successful rewiring of the 450W conference centre panel and a step by step battery maintenance demonstration.

Our second workshop in wind power saw the raising of our second demonstration turbine at the Simms house and another battery demonstration.

The small army of staff and volunteers raised the 45 foot AirX tower without a hitch, despite what was at times harrowing weather.



RE team and volunteers installing second wind turbine

Our final workshop will focus on strategies for green heating in the home. Slated for September 22nd and 23rd, this is especially suited to those who are interested in renewable technology with a good pay-back period that can make an immediate and palpable difference in the home.

Afterwards we will be turning our attention to the ongoing development of the energy experience project. (Please see page 3 for an article on this exciting initiative.)

On the international front, renewable energy staffer Noel Dekking is reportedly doing quite well in his placement with NGO Grupo Fenix (grupofenix.org) in Sabana Grande, Nicaragua. Noel is assisting in an initiative to produce and install solar ovens for a string of local communities.

In other initiatives, RE intern Justin Carroll will be headed to Cuba at the end of September to begin a five month term with the faculty of energy efficiency at the University of Santiago de Cuba.

In this issue we bring the merits of the electricity grid into question, talk energy experience kits, and profile a local solar heating contractor. Enjoy and happy potato season!



Transmission Lines Are Cool, But...

I HAVE a small confession to make:
I think transmission line towers are cool.

The truth is that with their silky fine lines and elegant angularity it's kind of hard to see the harm in clearing a bit of natural land for utility easements. Well, almost.

A quick Google search for images only deepens the problem as page after page of gorgeous transmission lines greet me, each strikingly set against a picture perfect sunset. They say it's hard to admit you have a problem, but once you've done so then you are on the path to recovery. Right? Well, researching into how far our electricity travels in the distributed electrical grid I didn't erase my love for transmission towers, but I did discover that local generation is one possible solution to an onerous and inefficient grid system.

So how far does electricity travel to get to your door? Well in terms of the Canadian and U.S. electricity grid it isn't that easy to look at how far your electricity flows as the system is united into a single power pool. When a consumer requires electricity the entire grid reacts to furnish that supply.

Imagine a lake. When suddenly a divot appears on its surface (demand for electricity) the surrounding water immediately rushes into that divot, restoring the equilibrium of the water body. The overall water level (or overall system voltage) remains effectively unchanged. So electricity isn't really traveling long distances and this seems like a reliable system.

But this leads me to wonder how reliable it is, and given that reliability, what level of efficiency a highly distributed and redundant electricity system can offer.

Since large scale deregulation of the electrical utilities began in the nineties the electrical grid has seen increased risk of blackouts as a result of long-distance electricity trading. Deregulation was introduced to bring market competition into the electricity business as a means of using infrastructure to fuller capacity.

One negative effect this had was to increase the long distance trading of electricity. Now picture a huge divot appearing on one side of the lake (buyer), and a mound of water that appears on the other side (seller). Once settled the net water level has not changed but there is a large momentary flow of water across the lake.

This is the equivalent of being able to buy a widget from half way round the world via an online distributor. As many

of us have seen, even given the long distances involved, the price is often unbeatable. While this system works (questionably) for the widget, the electrical grid is not set up to support long distance travel of electricity. Since transmission lines have been designed to service local areas this added flow is contributing to system bottlenecks. In the case of the California electricity crisis and the rolling northeast black-out of 2003 we're talking about extremely large (and costly) bottlenecks.

If the jury is still out as to whether the grid is reliable then it has delivered a verdict as to its efficiency. The physics of electricity transmission dictate that some power is lost to electrical resistance, or the simple heating up of wires, a phenomenon that is exacerbated by system bottlenecks. To quote a U.S. figure: transmission and distribution losses were about 5% in 1970, and grew to 9.5% in 2001. (US Dept. Energy)

Given the current track record of electricity supply management and the built-in inefficiency in sending power long distances it appears that the search for alternatives is warranted.

One promising (and not so new) alternative to remote centralized generation is local generation which encompasses a wide variety of application dependent technologies. Local supplies

“Given the current track record of electricity supply management ... it appears that the search for alternatives is warranted.”

negate transmission losses and reduce green house gas emissions.

At the forefront are technologies such as wind and photovoltaic (solar). These supplies can be scaled to the size of the surrounding consumer base and are renewable. For industrial applications where supply must be guaranteed there are fossil fuel based generators such as steam turbines run by natural gas. These local turbines have the advantage of cogeneration, also known as combined heat and power (CHP), which uses the waste steam from the turbine process and uses it as a substitute for other industrial proc-

esses or for facility heating. Cogeneration is especially powerful in its potential for community or industrial park integration, whereby excess generation steam can be used as a heat supply for surrounding communities or shared between industrial users.

One criticism levied at local generation is applied to its higher cost per kilowatt of generation capacity as compared to centralized generation. However, this analysis doesn't take into account the high capital costs involved in transmission system implementation and operation.

As the electricity industry stands now there are significant barriers to the implementation of local power. Utility provider culture with regards to acceptance of local generation has been slow on the uptake. Antiquated or non-existent pol-

icy for grid connection makes tying into the grid difficult and if achieved, resale of power to any one other than the utility is prohibited.

The case for local energy production is a strong one due to its efficient and integrated nature, and as a valid response to a poorly managed electricity supply. So while I may still allow my gaze to linger a little too long while passing a length of transmission line, I've learnt that it's important to be aware of where one's electricity comes from and to support efforts to develop integrated local solutions.

Justin Carroll is an intern in the Renewable Energy Program at Falls Brook Centre.

Energy Experience

— Brent Crowhurst

THE FALLS Brook Centre Renewable Energy team is currently hard at work on our *Energy Experience* project which is all about working with young New Brunswickers to promote an understanding of science and engineering while developing an interest in sustainable energy systems and the environmental and social impacts of the status quo.

A big part of the project is building a series of Energy Education Kits connected into the public school curriculum, complete with the theory and materials required for activities and demonstrations, and capable of being delivered by Falls Brook Centre staff or provincial middle and high school educators. These kits are really cool and allow the students to learn about energy by experiencing it first hand.

Beyond the Energy Education Kits we are also developing a more comprehen-

sive, hands-on suite of activities and demonstrations intended for school group visits to the centre or staff visits to schools in the province. More interactive displays and activities are being added to our already comprehensive suite of demonstrations.



Three phase power transformation and transmission demonstration

We are also developing a provincial engineering design competition with a focus on energy efficiency, energy conservation, and renewable energy for high school students. The competition will involve the definition of a specific en-

ergy related problem and the provision of a toolkit of materials and equipment to each participating team. Rules regarding sourcing of other materials for the project will also be defined. Project entries will be evaluated for performance based on the criteria outlined in the problem definition in a competition arena system to be built by our team.

If you want to see more about this project check out www.fallsbrookcentre.ca/experience and make sure to stop by the Falls Brook Centre for the annual fall fair on September 7th, 8th, and 9th. There will be daily tours of our demonstrations including our solar and wind powered Netmetered home and small scale bio-diesel production facility. Dr. Richard Komp of the Maine Solar Energy Association will also be here to talk about solar power.

Brent Crowhurst is the Renewable Energy Program Coordinator at Falls Brook Centre.

Profile: Sunwave Energy

— Justin Carroll

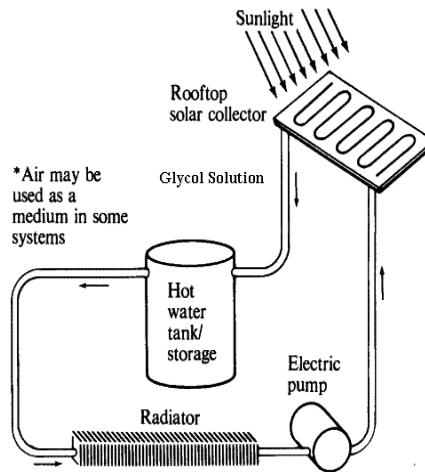
IT DOESN'T take one long to guess at the number of companies you'd find in the phonebook that offer solar heating contract services. There simply aren't any. But in view of the current surge in pro-environment policy and progressing public attitudes this will surely change. James Myshrall of Sunwave Energy, based in Woodstock, is one of a small legion of contractors who are establishing an alternative energy market in New Brunswick.

That solar home heating is still considered 'alternative' when it makes a pressing environmental and financial case doesn't deter James who has seen his business grow by steady strides since its inception last year. He sounds satisfied as he describes the projects he has implemented (nine to date) and the elegant simplicity with which they are implemented.

Sunwave's product is a scalable home and home water heating system that uses rooftop solar collectors to trap solar radiation. With the aid of a circulating pump, glycol solution is moved through the collectors and warmed in the daytime sun. This fluid, which can reach 90 °C, is used with a heat exchanger to heat water in a water tank and can also be pumped through radiant/in-floor heating channels. These systems have a 25 year life time and are low maintenance requiring a yearly glycol flush that takes about an hour.

Now for a quick primer on solar collectors for those of you who may be curious. Collectors are positioned on a home so as to maximize their exposure to sunlight. In a similar fashion to solar panels they are usually roof mounted and face the direction of the most annual average sun (south in Canada). The panels contain a series of flow tubes or a single serpentine tube to maximize the surface area exposed to the sun. The tubes are separated from the outside by a pocket of insulating air trapped in the

sealed collector. Two ports are then made available on the collector, one to allow cooler liquid in and another to let the hotter liquid out. Finally the fluid to be heated (usually glycol, but water can be used in direct heating applications) flows through the collector and is available for heating applications in the home.



Simplified Solar Heating Diagram

In today's market James has found it most cost effective to import his panels but is inspired to one day manufacture his own locally. Followed through, this dream would see Sunwave export systems internationally, and indeed his partner is set to fly to Cuba in the next couple weeks to scout for possibilities.

Local production of panels and auxiliary equipment may be one way to reduce the initial installed cost of a system which many potential clients have found too daunting. At an initial installed cost of ~\$10k for a typical 2000 sq. ft. home, James admits that the system is out of reach to some. But he doesn't attribute the slow pace of adoption to a steep startup cost alone. "The problem with Atlantic Canada is that too often we take the wait and see approach," a conservative attitude that James attributes in part to the limited capacity of New Brunswickers on a fixed income to gamble with their money. James adds that there are alternatives, pointing out that one of his clients secured a loan to invest in a system.

But for those in a situation more suited to making an investment, especially new home builders, the rewards can be very enticing. James quotes a payback period in the range of three to four years for a system that provides both boiler and home heating. This agrees with estimates on the web, which vary depending on source, market, and location, but generally fall within a period of four to eight years.

James believes that public promotion of solar heating would help to stimulate the market and that both the federal and provincial levels of government could be doing more in this arena. Having spoken with representatives at both levels he has found it frustrating that a high degree of interest has been shown, but little action has been taken.

But for James the road ahead is looking sunny. Working as a team with his nephew he has several projects on the go, and is currently in the process of pitching or negotiating future projects, two of which are large scale water heating applications. At the end of the day James notes that what motivates him is that moment where he has finished a job, shakes hands with the client, and knows that they are receiving something they'll be happy with. After all, as an investment, solar heating is great for the environment as well as the wallet.



Contact Falls Brook Centre:
125 South Knowlesville Road
Knowlesville, New Brunswick
E7L 1B1 Canada
Phone: 506-375-4310
Fax: 506-375-4221
www.fallsbrookcentre.ca